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ABSTRACT

This final report concludes a one-year study of the individually prescribed instruction (IPI) mathematics program as an instructional approach in grades 1-6. A comparison was made in one school district between traditional classes and those under the IPI program. Classes were matched by mean I.Q., previous mathematics achievement, and socio-economic status. The results showed that no significant difference occurred between the control and experimental groups in achievement, but a positive difference was found in teachers' and pupils' attitudes. (RS)

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William F. Meade
Lawrence M. Griffin

Horseheads Central School Dist. #1
Horseheads, N. Y.

August, 1969

Final Report

New York State Experimental and Innovative Program, Article 73, Section 3602_a, Subdivision 14 of the Education Law

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Horseheads Central School District #1
Horseheads, New York 14845

ABSTRACT OF THE PROJECT

Title: A Comparative Study of Student Achievement and of Other Selected Student Characteristics in a Program of Individualized Instruction in Mathematics and in a Program of Traditional Instruction in Mathematics in Grades 1 - 6.

Principal Investigators: William F. Meade and Lawrence M. Griffin

Principal Consultants: Norman Becker and Francis P. Smith

Federal Funds Requested: $39,828.00 Granted: $28,260.33

Duration of Activity: September 1, 1968 to June 30, 1969

Summary:

Objectives -- It is proposed to compare the Individually Prescribed Instruction Mathematics program to be conducted in one Horseheads Central School's elementary building with the traditional mathematics program in the other elementary buildings of the district in grades 1 - 6. The bases of the comparison will be students previous mathematics achievement and selected attitudinal variables. A guide to assist other schools in the implementation of IPI will be prepared.

Expected Contribution to Education -- It is expected the research will make it possible to reach valid conclusions regarding a well publicized approach to individualized instruction. A legitimate study of IPI is needed by a group who will publish results independent of Research for Better Schools, (RBS.)

Procedures -- The research will have the following stages; 1) Match classes on mean I.Q., previous achievement in mathematics and socio-economic status; 2) administer pre test instruments; 3) implement the IPI program in the experimental school for one school year; 4) compile final and post data, analyze the data in light of stated objectives; 5) prepare the final report.

Explanation of Individually Prescribed Instruction -- The diagnostic instruments based on the objectives of the learning continuum and the materials prepared for each objective permit the teacher to develop individual lesson plans or prescriptions. Having determined the student's placement by means of the placement test and the pre-unit test, the teacher considers the materials available for the objective, the techniques of instruction possible for this objective, and certain student characteristics as they relate to instruction. The prescription should relate to one objective at a ~~time, making~~ every attempt to raise the entering behavior score to a specified mastery level and should indicate the kinds of instructional materials, the number of pages or work sheets and who is prescribing. The CET measures mastery of each objective, contains a limited pretest of the next objective, and provides the

key date for prescription writing. Lack of mastery on the posttest indicates the need for additional prescription in that particular unit.

Having received his prescription form the teacher, the pupil's activities include the following: securing the appropriate instructional materials; determining his knowledge of the instructions, whether he needs assistance, his rate of work, his completion of the prescribed work, having his worksheet scored, and participating in small and large group instruction when such is utilized.

Teacher activities are primarily geared to preparing prescriptions, diagnosing the student's needs and giving individual assistance to students. He also determines when small or large group instruction for students should be utilized and helps evaluate the effectiveness of instructional materials and procedures.

The various administrative functions that are necessary for the effective implementation of IPI include the following: adequate scheduling of classes, inservice training for teachers, data collection, supervising teacher-aides, supervising teachers in their innovative roles, providing for storage of the variety of materials, providing planning time, and promoting positive parent-community relationships.

Achievement tests (SAT) were used to indicate achievement gains by both control and experimental groups.

Additional survey tools were used to determine teacher and pupil attitudes in control and experimental groups.

The results show that no significant difference occured between the control and experiment groups in achievement, but a greater positive difference was found in attitude in teachers and pupils.

Not only did the experimental pupils report they liked math better, they reported they liked school better than control groups. Teachers indicated that they enjoyed teaching in IPI more than in other subjects taught traditionally. It was more work many said, but better results and more immediate help to the students made them enjoy the work more.

Although the apparent change in the teachers' general effort and attitude toward her work seemed to be greatly improved no objective measures were made. In general, the teachers seemed to increase their enthusiasm for their work and be willing to search for their own improvements in other areas. The process of learning how to teach IPI was a very positive educational experience for all involved.

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Progress Report on

A Comparative Study of IPI Mathematics versus Traditional Instruction

OBJECTIVES

General Objectives: To test the validity of the IPI mathematics program as an instructional approach in grades 1 - 6.

Specific Objective: To test the hypotheses listed below.

Group 1 -- Student Achievement

1. Since every pupil can move at his own pace in IPI, the mathematics achievement of the experimental groups will be greater than the mathematics achievement of the conventional instructional control groups.

Group 11 - Student Attitudes

1. The study will determine which students are best fitted for IPI instruction. It is expected that the independent student will do as well in either method, but that students low on dependence may do better in mathematics in the conventional control groups.
2. Students with a more positive attitude toward mathematics will do better in IPI than in conventional instruction.
3. IPI students will develop a better attitude toward mathematics than those students in conventional classes.
4. IPI instruction may have an affect upon a students' dependence.

Group 111 - Teachers

1. Classes with teachers having positive attitudes toward IPI will achieve better than classes with teachers with negative attitudes toward IPI.
2. The change in the teacher's role required by IPI can be accomplished through a minimum amount of in-service training.

Group IV - IPI Implementation Manual

1. As a result of this project experience, the project's principal investigators will complete a document which will provide enough information to enable schools to implement an IPI program.

PROCEDURES

Subjects

Thirteen classes containing 343 students, half from each grade level from the Broad Street Elementary School (School A) are receiving the IPI treatment. The remaining students in that school, receiving traditional mathematics, are serving as one control. Classes of students from the Gardner Road Elementary School (School B) have been matched to IPI classes, as a second control group, by I.Q. previous achievement and socio-economic status.

Table I summarizes the experimental and control groups. All classes are homogeneously grouped by achievement and the sixth grade is partially departmentalized.

Table I

	School A				School B	
Grade	IPI Sections	No.	Control Section	No.Students	Control Section	No.Students
1	1,4,5	66	2,3,6	63		
2	2,4	53	1,3,5	75		
3	2,4	51	1,3	52		
4	1,4	61	2,3	64		
5	2,4	54	1,3,5	79		
6	1,4	58	2,3	61		
Totals	13	343	15	394		

Treatments or Conditions

Our IPI program will provide for:

1. Individualization of each student's pacing through a carefully sequenced set of objectives for mathematics instruction, grades 1 - 6.
2. Mastery of mathematics subject matter by individuals as they proceed through the objectives.
3. Some self-direction, self-evaluation, and to a limited degree, self-initiation on the part of the learners.
4. Individualized techniques and materials of instruction.

All of the above are based upon the definition of individualized instruction as an instructional system which provides for the planning and implementation of an individualized program of studies. The description of this IPI program which follows presents the necessary details of the instructional program which has been implemented.

Behavioral Objectives

The development of an educational program that provides for individual differences among students requires a clear knowledge of educational objectives. There is little doubt that specifying educational objectives in terms of student behavior is a useful approach for individualizing instructional programs. It simply means changing the behavior of a student so he is able to display a talent he didn't previously show. Teachers, then, must also know what the specific behaviors are and determine when and where they apply.

Behavioral objectives are developed at three levels.[1] The philosophy of the Horseheads Central School District and the aims of American education in general indicate that students study mathematics. This is level one. Determining the particular course of study and the defining of each unit of work in mathematics continuum can be considered the second level. Stating the specific objectives of each unit of work in mathematics, then, is the most specific and the third level of instructional development.

The Learning Research and Development Center of the University of Pittsburgh provided the leadership in meeting with classroom teachers to determine the areas of work that children study in learning mathematics. Thirteen specific areas were developed to compromise the mathematics continuum of the Horseheads Central School's mathematics curriculum. The thirteen areas include: Numeration, place value, addition, subtraction, multiplication, division, combination of processes, money, time, system of measurement, geometry, fractions, and special topics.

Within these areas, behavioral objectives were then written in sequential order by levels, A-H. For example, at Level A, students are expected to be able to:

1. Given two equivalent or non-equivalent sets of objects, up to ten, matches the elements in a one-to-one relationship.
2. Draws or arranges sets of objects to illustrate addition and subtraction facts through six; e.g., adds some objects to make two sets equal, adds some objects to make a set match a given number, circles the correct numeral for pictured addition statements.

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[1] Krathwohl, David R., "Stating Objectives Appropriately for Program, for Curriculum, and for Instructional Material Development", Journal of Teacher Education March 1965.

Diagnostic Instruments

Diagnosis of pupil achievement plays a vital role in the IPI system. In order to guide the learning experiences of individual pupils, it is essential for the teacher to have information about pupil performance related to the specific objectives in the continuum. This information provides the basis for helping the teacher decide where each pupil should begin work and when that pupil is ready to proceed to the next task. Four types of tests have been developed for this purpose.

Placement Test in Mathematics (Example in Appendix A)

A battery of six tests has been developed for the purpose of determining individual placement within each content area. Each instrument is designed to test pupil performance in each of the content areas in the level. So, for example, the Level B test includes sections on Numeration, Pace Value, Addition, Subtraction, Fractions, Money, Time, Systems of Measurement, and Geometry. The six tests are for Levels B through G inclusively.

Not every objective in a unit (e.g. numeration) is tested on a placement test for that level. In order to keep the length of the test to a minimum while providing for maximum of information, only the most important or characteristic objectives in each unit are tested. No oral exercises are included in the placement tests.

The placement tests are to be administered at the beginning of the school year. Based on past performance of the pupils on these tests the following pattern of administration is suggested.

Grade	Tests	Grade	Tests
1	B	4	D and E
2	B and C	5	E and F
3	C and D	6	F and G

Since the purpose of this placement testing is to provide a general indication of pupil performance as efficiently as possible, flexibility must be introduced into the system by the teacher. If, for example, a child in grade four has difficulty with the Level D test, he probably should not be given the Level E test. The information provided in the Level D test would be sufficient to indicate the unit in which the child should start working. On the other hand, if a pupil in grade two should have mastery of several units in Level C he might be given the Level D tests for those units. The prime goal is to get the pupil started in the appropriate learning exercises as quickly as possible with as much accuracy as possible.

A child is considered to have placed in a given unit at a given level if he scores between 20% and 80% on the placement test. A score above 80% indicates that the child should be tested at a higher level, while a score of below 20% indicates that the child should be tested at a lower level.

The IPI Pretest (Example in Appendix B)

The purpose of this test is to determine which skills within the level require further work. Fro example, a pupil is administered the D Multiplication pretest, His percentage scores on each of the skills are as follows:

Skill 1	100%	Skill 5	100%
Skill 2	60%	Skill 6	20%
Skill 3	100%	Skill 7	100%
Skill 4	100%	Skill 8	100%

Since he must score 85% or better on all skills, the pupil does not pretest aut of the unit, but rather, should first be given a prescription for Skill 2. After he has achieved mastery of this skill, as indicated by the curriculum embedded test, he should then be given a prescription for Skill 6. After mastery of this skill the pupil would be given the posttest.

Curriculum Embedded Tests (Example in Appendix C)

The function of the curriculum embedded test (CET) is to assess mastery of one particular skill within a unit. A CET will be administered at specified intervals in the sequence of work sheets prescribed for the attainment of the skill. The CET in math has two parts. The second part (below the double line) serves as a short pretest of the next objective in that unit of the curriculum. If the skill being tested is the last skill in the unit there will be no test below the double line.

If the pupil masters the CET (upper part) within an 85% criterion level he will proceed to the next skill in the unit which he has not yet mastered, If this is the last or only skill in which the pupil lacks mastery in that unit he should be given the posttest for that unit. If the pupil does not achieve mastery on the CET he will be given further work pages of other exercises in that skill and will be required to take another CET (an alternate form of the CET when available).

The second part of the CET (below the dotted line) is important when the pupil needs work in the next skill in the unit, e.g. when a pupil is working in C Numeration 2 and did not have mastery of C Numeration 3 on the pretest. If the pupil indicates mastery (once again 85%) on the second part of the CET he should be prescribed the CET for the next skill rather than actual work in the skill. If he masters the CET (first part) of this skill he will have tested out of that skill and proceed to his next requires skill or to the unit posttest.

Materials

If Individually Prescribed Instruction is to be effective it requires lesson materials that teach each of the many objectives that make up each curriculum sequence. Furthemore, it requires that such materials be of a type which, for the most part, the pupil can study quite independently. This section discusses some of the characteristics of such materials and some of the procedures involved in their development.

The key to materials for IPI mathematics is the set of performance objectives that have been devloped. Is is obvious that materials must be matched to the objectives. It was found that very few materials are commercially available which met the performance objectives and were also acceptable to the IPI procedures. Therefore, a great majority of the materials had to be created.

A rigorous system was developed to match materials and objectives. Several years of work at the LRDC at the University of Pittsburgh finally resulted in a set of materials which is satisfactory. Even with this background of testing, materials are still tested and revised as needed.

The materials consist of multimedia items which appeal to all senses. The great majority will be linear in nature, but for those students requiring it, other stimuli will be used.

The pages of materials are prepared as single pages. This allows for flexibility in assigning or prescribing materials. It is of the utmost importance that the materials be so organized that they can be prescribed in any sequence. The diagnosis indicates the need. A few examples of work sheets are included in Appendix C. As will be apparent the basic format of the work sheets is self-instructing.

In addition to the work sheets, there are tapes and manipulative materials which are prescribed for those students needing them.

There is no attempt made to supervise that materials stirage centers with adult personnel, but rather, children are to be responsible for getting their own materials.

In the primary grades students may have help in the selection of prescribed materials and will have all worksheets and tests marked for them. As they progrres in independence they begin to mark their own work sheets until by grade 5 or 6 most work sheets are self corrected.

The materials are a vital part of the IPI program. They must provide a flexible program for all pupils.

Staff

The Teacher's Role

As ou might suspect, the teqcher has a new, challenging, but exciting role in an IPI program. No longer does the teacher spend the majority of her time "spouting" information. In IPI, the teacher must find time to:

1. Diagnose student's strengths and weaknesses.
2. Write student prescriptions.
3. Prepare new and/or revise materials (tapes, worksheets,etc.)
4. Plan individual programs with teams.
5. Provide individual students with assistance.
6. Work with small and large groups of students.
7. Direct the work of the teacher aides.
8. Study students previous work for future planning.

9. Remain warm and friendly in dealings with children.
10. Study new ideas and directions in mathematics.
11. Evaluate materials and procedures used in IPI.
12. Participate in inservice training workshops.

The Teacher's Aide Role

Teacher Aides are an essential part of the IPI program. Scoring the student material used in the IPI project, keeping day-to-day records and providing feed back material to teachers are among their most important tasks. These tasks can be broken down into more specific functions under the three major areas listed below.

1. Classroom functions

    a. Grades 1 - 2 - 3
        (1) Scoring and recording all placement tests.
        (2) Scoring and recording all unit tests, making breakdown of the tests by skills, prescription sheets.
        (3) Scoring and recording all student worksheets.
        (4) Obtaining and placing all worksheets in student folders.
        (5) Locating sound discs for pupils and assisting them with sound discs and machines.
            a. scoring and recording all work pages supplemental to the sound discs.
        (6) Replacing and duplicating continuum materials.

    b. Grades 4 - 5 - 6
        (Similar activities, except less help and correction for pupils).

2. Functions supplemental to the classroom - all grades.

    a. Keys and prescription folders
        (1) Making keys for teachers.
    b. Work pages - Continuum
        (1) Keeping inventory, duplication, ordering, numbering in proper sequence and storing the pages.
    c. Weekly reports.
        (1) Current status of work with units for use in teacher's conferences
    d. Filing work.
        (1) All tests numbered in order taken and filed in each student's test file.
        (2) Completed student's prescription sheets placed in students' folder.

3. Functions relevant to the study.

    a. Recording for computer use the following information regarding -
        (1) Tests taken, scores, skills worked, pages done in the skills, days worked, order in which the unit skills were worked.
    b. Specific weekly reports for local project, LRDC and RBS projects, (recording information for).
    c. Taking inventory and ordering materials.
    d. Preparing dissemination materials.
    e. Soring, recording and graphing achievement tests and I.Q. tests.

FACILITIES AND GROUPING

The ideal in arrangement in facilities and grouping of students has not as yet been discovered. Yet, there is no question that they do have some influence on the learning by students. Is there a way to organize for IPI which is better than others? Perhaps, but this should not deter trial use of the program.

At Broad Street, the children are currently grouped homogenously by achievement with four sections per grade being the usual pattern. As far as IPI mathematics is concerned, how the children are grouped does not matter, since students work independently most of the time. Small or large groups can be scheduled within the class or among several classes when this seems desirable. Concern then becomes important for grouping students in other subjects or activities.

The building at Broad Street is designed along conventional lines. It is generally "U" shaped with 2 classroom wings joined by service and special facilities. The one additional space indispensible to IPI mathematics is a central store room for the individual work pages and testing materials. A supply room was converted for this purpose.

Although not essential to this project, the building does contain a 6,000 volume library; central storage for several hundred film strips, records, etc.; an auditeria; a two-station gymnasium; general offices; and, several small offices and work areas.

COST

At present, IPI cannot be initiated into the curriculum without additional cost. During the Field Trial Stage of this program the cost of materials is $15 per student. To this must be added the cost of teacher and aide training, materials, training workshops, the salaries of the aides, and any renovations necessary. During 1969-70 costs will be $12 per child for materials. 1970-71 costs for materials are planned at $6 per child. This is for materials and the process.

As the number of schools using the IPI mathematics materials is increased, their costs reduce. It is anticipated that the ultimate cost for materials will be about the cost of the average elementary school math textbook.

EVALUATION

It is obvious that a significant amount of time is devoted to student testing as an integral part of the IPI program. The major use of this testing, however, is for diagnostic purposes. Since the student must score at 85% or higher to progress, testing for student grades becomes much less important than in conventionally taught programs. Reports to parents on student progress is in terms of the number of units completed on the continuum.

Proper evaluation of the project in Horseheads requires the use of many instruments to assess its many factors. The instruments selected have been grouped below according to these factors.

EVALUATION DATA

Student Achievement

A. Stanford Achievement Test - Complete Battery

1. Refer only to mathematics subtests
2. Use form X for pretest and form W for posttest.
3. Use levels as follows:
    a. Primary I for grade 1
    b. Primary II for grade 2 and 3
    c. Intermediate I for grade 4
    d. Intermediate II for grades 5 and 6

B. New York State Mathematics Tests

1. Administer to grades 3 and 6
2. Use previous year's data for grades 4 and 5
3. Readminister test following fall

C. IPI Placement Test

1. Placement tests were given to both experimental and control groups at Broad Street in the fall.
2. A follow-up test will be administered in the spring.

Ability

A. Otis-Lennon Mental Ability Test

1. Administered each year to grades 3 and 5
2. Data for some grades will be a year old
3. Use levels as follows:
    a. Elementary I for grade 3
    b. Elementary II for grade 5

Attitudes

A. Attitude toward school (See Appendix D)

1. Test 1 - for experimental and control groups
2. Test 2 - for experimental groups only
3. Administered in February

TEACHER DATA

Attitudes

A. Teacher Attitude toward Program (See Appendix E)
(RBS scale)

B. Attitude toward use of IPI (See Appendix F)

1. Locally constructed.
2. Administered in fall and will be administered again in the spring.

ANALYSIS

The analysis design was created by and was to have been performed by Mr. Norman Becker, then a doctoral candidate at Cornell University. Although he performed well in every other duty, the analysis was not completed. The results shown herein are presented in the best form possible under the circumstances.

The analysis listed by general areas of objectives was to have been as follows: --

A. Student Achievement - A three way analysis of co-variance (Hays 1963)[1] will be used to test the effects of the Experimental Treatment on Student Achievement.

B. Student Attitudes - A three way analysis of co-variance (Hays 1963)[1] will be used to test the effects of the Experimental Treatment on student attitudes.

C. Teachers - Teachers in the experimental condition will be given an attitude survey prior to the implementation of the IPI program. The survey will measure their attitude toward IPI. The teachers will be divided into high and low on this measure through the use of a median.

IMPLEMENTATION

A manual for implementing IPI in a school has been prepared. This step-by-step guide deals with the many problems faced in implementing IPI at Broad Street School with suggestions for solving them.

An outline for the manual is included in Appendix G. The manual is included in Appendix I.

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1. Hays, William., Statistics for Psychologists, Holt, Rinehart and Winston, N.Y. 1963.

STATUS OF THE PROJECT

Training

Mr. William Meade attended the RBS three week IPI training course in Philadelphia from May 6, 1968 to May 24, 1968. At this point, budget problems seemed to indicate that the project could not be continued. This indefinite status continued until the middle of August when enough funds were made available to carry out this project which has been scaled down from the original proposal.

Thus, teacher training was accomplished the last week in August, with 12 teachers in attendance. Five seven hour days were devoted to this training conducted by Mr. Meade. A major problem encountered was the lack of sufficient training materials created by the late ordering date. This was overcome by duplicating materials from Mr. Meade's set of materials. In retrospect, it would appear that one week of training was not sufficient, judging by the numerous follow-up sessions which have been conducted. A second week coupled with adequate training materials and students seems more appropriate.

Again, the late date of approval to begin the project delayed the actual starting of the program. Late ordering resulted in delayed shipment of placement tests. Consequently, it was late September and early October before the placement level of students was completed and the program could be started.

Four teacher aides attended training sessions to learn their roles in the IPI system. These sessions, also conducted by Mr. Meade, were held from September 23 to 27.

Procedures

The thirteen sections, under twelve teachers (the sixth grade is departmentalized) actually began work in the program on October 7th. Each section is devoting 40 minutes each day to mathematics. No more than four sections are scheduled during any given block of time so that an aide can be available to each teacher for the mathematics period.

Aides devote the rest of their time to correcting work, completing reports, supervising the materials center, materials control, and duplicating materials and meeting with teachers.

Students, as a result of prescriptions written by their teachers, are engaging in a variety of activities designed to help them master the sequenced skills. They complete IPI work-sheets, listen to records, view filmstrips, work in pairs or small groups, engage in large group activities, and work with appropriate manipulative materials or games. The amount of variety is increasing as the teachers gain more experience with this program. As might be expected, initial prescriptions are centered around the IPI work sheets.

The students are accepting responsibilities for their own work very well. They are exercising self-discipline in moving around in class rooms and in going independently to the materials center to pick up their work sheets. In addition, they are working very diligently on their prescriptions. This applies almost equally to all sections whether they have been high or low achievers in the past. There are students who now do some perfect papers whose previous patterns showed little else but failure.

EVALUATION

Achievement and Ability

The Stanford Achievement Tests were administered to all elementary students in the district in May, 1968. These will be administered again in May, 1969 and the results compared.

The New York State Mathematics Tests were administered to students in grades 1, 3 and 6 the week of October 7, 1968. Since these will not be given again until the fall of 1969, and since a different group of students will be tested, it has been decided not to include a comparison of this data in the study.

The Otis-Lennon I.Q. Tests were administered to students in grades 3 and 5 on October 14th. The Elementary I level was administered in grade 3 and Elementary II for grade 5. Grades 4 and 6 were tested one year ago.

The mathematics scores on the Stanford Achievement Test and the I.Q. scores have been compiled for each section, both experimental and control, and medians and ranges identified. This information has been used to identify the control sections from Gardner Road Elementary School.

All students in the Broad Street Elementary School took the IPI Placement tests. Originally it had been planned to devise a sample test for the control group. This approach was discarded when the infeasability of constructing a valid sample test was considered because of the lateness in starting and the time required to construct such a test. The post test will be likewise administered.

Attitudes

Examination of existing attitude scales for children led us to the conclusion that none of them suited our purpose. Consequently, the project directors and consultants, under Mr. Becker's direction, devised two instruments, samples of which are in Appendix D. The first was designed for IPI and control groups and the second part for IPI groups only. These instruments are being completed presently through the interview technique. The purpose of these instruments is to determine student attitude toward math in general and to see what differences can be determined between IPI groups and control groups.

Two dimensions of teacher attitude have been sought. A very simple attitude scale (see Appendix F) was developed for pretesting and posttesting teacher attitude changes toward IPI as a result of the teacher training sessions. In addition, teacher attitude toward IPI as an instructional system is also being sought. The attitude questionnaire published by Research for Better Schools will be administered later in the year.

DISSEMINATION

Brochure

The brochure was completed on February 3, 1969. 9,000 copies have been sent to the Center on Innovation. Nearly 8,000 were distributed in the local district. Another 250 have been sent to the Southern Tier Regional Education Center for distribution in their area. Copies have been sent, also, to two local newspapers.

Information Booklet

Two hundred and fifty copies of a 43-page information booklet have been mimeographed and are available for visitors to the project. Some copies have been distributed locally and to STREC. Twenty-five have been sent to the Center on Innovation. Completion date for this booklet was February 7, 1969.

Project Visitors

As of June 30, 1969 there have been a total of 324 visitors to the project. Of these only eleven have been from within the district.

IPI Presentation

A team of people, consisting of Dr. Harry Q. Packer, William Meade, Lawrence Griffin and an IPI teacher have presented the IPI program to each of the other eight school buildings in the Horseheads School District.

Mr. Meade has presented the program to his Parent's Club and to the parents of students involved in IPI on three occasions. He also has made presentations to the Center Street Elementary School Mothers'Club, the Rotary Club, Elmira College, Mansfield State College, Big Flats Elementary School P.T.A. and a fifteen minute presentation over WELM radio.

Reporting to Parents

A progress type of report to parents was developed and attached to the regular district report card. The report form indicates to parents, by the use of red and blue X's, where the child entered into the IPI continuum and the progress he has made in each area since placement. Parent reaction to this way of reporting has been very favorable. A copy of this report form is included in Appendix H.

RESULTS

Specific Objectives

Group 1. Student Achievement

1. Since every pupil can move at his own pace in IPI, the mathematics achievements of the experimental groups will be greater than the mathematics achievement of the conventional instructioned control groups.

   This objective cannot be proven from the Stanford Achievement results obtained in this project. The IPI students did as well as the control pupils. A few cases of significant growth were found but insufficient to make a significant difference.

   When the Placement tests results are used a much more significant difference is found. The children showed that the data from RBS is valid when it points out that where the Placement tests are used as pretest and posttest instruments the IPI group s do show a significant growth over the control.

Group 2. Student Attitudes

1. The study will determine which students are best fitted for IPI instruction. It is expected that the independent student will do as well in either method but that students low on dependence may do better in mathematics in the conventional control groups.

   It was found that the low groups of pupils were as successful in IPI as were faster pupils. Data indicates that there was no significant difference in the performance of high or low pupils.

2. Students with a more positive attitude toward mathematics will do better in IPI than in conventional instruction.

   The premise in this item was supported by this project. However it was also found that a larger percentage of IPI groups indicated that they had a positive attitude toward mathematics than control groups.

3. IPI students will develop a better attitude toward mathematics than those students in conventional classes.

   Survey and interview data report that a much greater number of IPI children enjoyed mathematics than control groups.

4. IPI instruction may have an affect upon a students' dependence.

   The data gathered in this project did not provide sufficient information to draw any conclusion regarding this item.

Group 3. Teachers

1. Classes with teachers having positive attitudes about IPI will achieve better than classes having teachers with negative attitudes toward IPI.

   No significant differences were found in relating teacher attitude and success in IPI. This is very difficult to study as all participants were so enthusiastic about IPI and held such positive attitudes toward IPI that it was really impossible to make judgments. Not all were positive when project was started. However, by the time the training program was completed (one week) all participants were positive.

2. The change in the teacher's role required by IPI can be accomplished through a minimum amount of inservice training.

   It was found that one week (35 hours) training session for teachers and aides is a minimum time to present the program. It was necessary to follow this with careful supervision for the first few weeks.

Group 4. IPI Implementation Manual

1. The manual is included in this report as Appendix J.

SUMMARY OF RESULTS

Pupil Achievement

- On standard achievement tests IPI pupils do as well as non-IPI pupils.
- Standard achievement tests do not adequately measure the IPI program since many of the IPI skills are not tested by standard normative referenced achievement tests. (less than 30%)
- There is need for new test construction designed as criterion referenced tests as opposed to normative referenced tests.
- On IPI placement tests the IPI pupils score significantly higher ststistically than do the non-IPI pupils.
- IPI does indeed provide for individualization for the learner by removing the ceiling for the learner. Scores and rate of progress for IPI pupils are statistically greater than those for the non-IPI pupils.

Pupil Attitudes

- Based on interview data, IPI pupils like school better than non-IPI pupils.
- IPI pupils like math better than non-IPI pupils.

Teacher Attitudes and Changes

- Surveys conducted over the past three years indicate that teachers are highly positive about the IPI program.
- Teachers are working harder in IPI than they would in other programs but obtain greater satisfaction since they can meet the challenge of individual differences for each pupil.
- Teachers, in spite of all their critics, are willing to make significant changes in teaching for children if somebody is prepared to offer a program with specific direction and help.
- Teachers become diagnosers of learning instead of dispensers of information.
- Teachers provide valuable feedback information for program changes.
- Teachers are taught to use the instructional system in a short period of time.
- Teachers use data to correct their writing of prescriptions.
- Substitute teachers can, with little training, manage the system of IPI, thus providing for a continuity.

Administrators

- The principal can be taught to use the system and in turn become the teacher and instructional leader for his own staff of teachers.
- New roles are created for the principal as an instructional leader.
- The principal uses data to manage the instructional system.

Other

- Costs for instructional materials have followed a decreasing pattern from:

1966-1967	$42.
1967-1968	$18
1968-1969	$16
1969-1970	$12

- The technology developed from IPI has broad application for the development of individualized instructional systems.
- Students in IPI do not always work in isolation. There is a 28% variation in the use of instructional settings. (RBS)

EVALUATION DATA

Student Achievement

A. Stanford Achievement Test

Pretest Data

Gr.	Arithmetic			Arith Computation			Skill Concepts			Arith Application		
	E*	c-1**	c-2***	E*	c-1**	c-2***	E*	c-1**	c-2***	E*	c-1**	c-2***
1	2.74	2.22	2.74									
	1.93	2.10	1.87									
	1.85	1.44	1.76									
2				2.72	3.12	2.78	3.15	4.12	3.20			
				2.61	2.41	2.63	2.15	2.61	2.22			
					2.08			2.41				
3				4.20	4.61	4.24	4.99	5.51	5.10			
				3.32	3.51	3.50	3.51	3.32	3.48			
4				5.10	4.12	5.29	6.52	5.58	7.00	6.55	5.15	6.20
				3.71	4.12	3.78	4.25	5.56	4.29	4.71	4.65	4.15
5				5.21	5.72	5.16	6.15	6.91	6.38	7.01	7.55	6.47
				4.10	5.25	4.21	4.98	6.23	5.18	4.92	6.41	4.70
					4.81			4.92			5.10	
6				8.75	7.84	8.63	9.51	7.26	9.47	9.23	8.15	9.45
				5.62	6.26	5.54	6.10	6.37	5.85	6.23	6.45	5.72

Posttest Data

Gr.	Arithmetic			Arith Computation			Skill Concepts			Arith Application		
	E*	c-1**	c-2***	E*	c-1**	c-2***	E*	c-1**	c-2***	E*	c-1**	c-2***
1	2.83	2.51	2.78									
	1.91	2.32	1.96									
	1.73	1.61	1.79									
2				2.81	3.15	2.82	3.22	4.42	3.18			
				2.72	2.61	2.71	2.65	2.15	2.41			
					2.11			2.61				
3				4.27	4.61	4.22	5.31	5.42	5.41			
				3.45	3.60	3.47	3.72	3.61	3.11			
4				5.73	4.26	5.37	6.61	5.55	6.35	6.67	5.02	6.53
				3.82	3.99	4.12	4.12	5.12	4.85	4.85	4.31	3.95
5				5.26	5.91	5.18	6.57	6.71	6.12	6.98	7.22	6.71
				4.72	5.47	4.57	4.32	5.72	5.81	5.32	6.81	4.22
					5.01			4.42			5.41	
6				8.91	7.86	8.82	9.63	7.35	9.33	9.69	8.31	9.49
				5.42	6.11	5.71	6.31	6.39	5.61	6.52	6.55	6.03

*E Experimental Group
**C-1 Control Group at Broad Street School
***C2 Control Group at Gardner Road School

B. New York State Mathematics Test

Pretest Data

	Grade 3 GRS			Grade 6		
	Group	% below min.	median percentile	Group	%below min.	median percentile
E*	2	1	96	1	0	98
	4	8	53	4	10	45
c-1**	1	0	99	2	0	90
	3	3	88	3	6	81
c-2***	2	1	90	1	0	99
	4	6	62	4	11	51

POSTTEST DATA NOT AVAILABLE

E Experimental Group
c-1 Control Group at Broad Street
c-2 Control group at Gardner Road

C. Placement Test Results (Pretest)

	IPI			Control		
Grade	Group	Median	Range	Group	Median	Range
1	1	B	A-C	2	B	A-C
	4	B	A-C	3	B	A-C
	5	B	A-C	6	A	A-B
2	2	C	A-C	1	C	A-C
	4	C	A-C	3	C	A-C
				5	B	A-C
3	2	D	A-D	1	D	B-F
	4	C	A-D	3	D	B-E
4	1	D	B-E	2	D	B-E
	4	C	A-E	3	D	A-E
5	2	E	C-E	1	F	C-E
	4	E	C-E	3	F	C-E
				5	D	B-E
6	1	E	C-E	2	E	C-E
	4	E	C-E	3	E	B-E

Placement Test Results (Posttest)

Grade	Group	Median	Range	Group	Median	Range
1	1	C	B-D	2	C	A-D
	4	C	B-D	3	C	A-D
	5	C	B-D	6	B	A-D
2	2	D	C-E	1	D	C-D
	4	D	C-D	3	D	B-D
				5	C	B-D
3	2	E	C-E	1	D	C-E
	4	D	C-E	3	D	C-E
4	1	E	D-F	2	E	C-F
	4	D	C-E	3	D	B-F
5	2	E	D-F	1	E	D-F
	4	E	C-F	3	E	D-F
				5	D	C-E
6	1	E	D-G	2	E	D-F
	4	D	D-E	3	E	D-E

PUPIL ATTITUDE SURVEY
Test I

Questions for IPI and Control Groups
(First column answers ~~IPI~~ -- Second column answers ~~Control Group)~~
Pretest Post test data

1. During the school day you work on different things like spelling or reading. What kind of things do you like working with the most?

Reading	38%	32 %
Spelling	15	8
Math	32	44
Other	15	16

2. What kind of classwork do you like least, or dislike?

English	15%	17%
Math	11%	5%
Reading	15%	18%
Science	18%	20%
S. Studies	18%	11%

3. What subject do you do best at?

Writing	18%	23%
Spelling	26	36
Math	15	32
Other	41	9

4. (Not applicable to 6th graders)
What subject do you think that the teacher likes to teach the most?

Reading	30%	32%
Math	24	31
English	18	8
S. Studies	10	9
Other	18	21

5. What subject is most difficult or hardest for you to learn?

Math	23%	15%
Reading	24	27
S. Studies	19	22
Science	16	13
Other	18	23

6. Do you ever tell your Mother and Father about the things you learn in school?

Yes	88%	93%
No	12	7

a) If yes, What subject do you tell them abput the most?

Reading	42%	41%
Math	27	35
Other	31	24

7. Do your parents ask you about the things you are learning in school?

Yes 31% No 45% ? 24%

8. What subject would your parents like you to do better in?

Reading	38%	41%
Math	24%	26
Writing	15%	7
Other	23%	26

9. What subjects do you wish that you could do better in?

Reading	42%	45%
Math	41%	40
Other	17%	15

10. (Exclude First Graders)
Do you like working on any subjects this year better than you liked working on them last year?

No 75% 87% Yes 21% 13%

a) If yes, which ones?

Reading	38%	31 %
Math	28%	37
Science	12%	11
S. Studies	13%	15
Other	20%	6

11. Do you wish that you didn't have to go to school?

No 61% 71% Yes 30% 21% ? 9% 8%

12. Have you ever thought that you would like to go to college when you are ready?

Yes 73% 72% No 42% 32% ? 12% 10%

13. Do your parents ever talk about your going to college?

Yes 35% 41% No 42% 32% ? 23% 27%

14. (exclude First Graders)
How are you doing in Arithmetic this year compared with last year?

a) Better 52% 58%
b) Worse 3% 1
c) About the same 45% 41

15. Do you worry at all about failing Arithmetic?

Yes 75% 61% No 25% 39%

16. Would you like the teacher to spend more time talking just to you while you're doing your Arithmetic than she does with some of the other kids?

Enough 25% 20% Yes 38% 41% No 37% 39%

17. Do you know the kids in your class that are better at Arithmetic than the other kids?

Yes 61% 67% No 18% 15% I don't know 21% 18%

Test I -- Page 3

18. Do you know the kids in your class that have the most trouble or do poorly in Arithmetic?

Yes 73% 79% No 12% 8% ? 15% 13%

19. How well are you doing in Arithmetic?

a) better than most kids 22% 24%
b) average 66% 73%
c) worse than most kids 10% 3%

20. Does the teacher think that you are doing well in Arithmetic?

Yes 50% 79% No 11% 13% ? 39% 8%

21. While you are working on all the different subjects that you study during the school day, when do you get a chance to talk most to the teacher?

Math	29%	37%
Reading	34%	39%
Other	37%	24%

22. Do you like to work at home on things that you are learning in school?

Yes 67% 71% No 18% 15% ? 15% 14%

23. Are there things that you learn in school that you would like to take home to work on?

Yes 45% 52% NO 19% 17% ? 36% 31%

a) If yes, what?

Reading	36%	21%
Science	18	15
Math	15	21
Soc. St.	21	23
Other	10	20

PUPIL ATTITUDE SURVEY
Test II

Questions for I P I Group Only*

Freedom of Movement

1. When you're working with IPI you often have to move around to other parts of the classroom. Do you like doing this?

   Yes 73% No 21% ? 6%

2. Sometimes while you're working with your booklet at your desk the other kids are moving around the room or talking. Does this make it harder for you to do your own work?

   Yes 31% No 27% ?42%

Materials Used in I P I

3. Sometimes when the teacher gives you a prescription uou work in your booklet or with devices and sometimes the teacher or someone else works with you. What do you like the best?

   Booklet 68% Someone 21% ? 11%

4. Sometimes the teacher will ask you to work with a device. Why does the teacher ask kids to work with devices?

   to help you 47% She wants to 35% I don't know 8%

5. Are there some devices that you like best to work with?

   Yes 63% No 29% ? 8%

   a) If yes: Which ones?

   manipulative devices (counting frames and flash cards)

6. Are there some devices you don't like to work with?

   Yes 19% No 81%

7. Do you wish that you could do more or less work with devices than you already do?

   More 63% Less 22% ? 15%

8. Do the devices help you to understand things or do they confuse you?

   Help 81% Confuse 15% ? 14%

---

* Administered only once, in May 1969

Tutorial Method

9 Has the teacher ever asked you to help one of your classmates with their work? Yes 81% No 19%

If yes:

a) Do you wish that the teacher would ask you to help other kids more than she does or less than she does?

More 62% Less 38%

b) Why do you think that the teacher asks you to help your classmates?

I can help 58% ? 42%

c) Do you think that most of the kids like it when you help them or do they wish that the teacher wouldn't ask you to help them?

Teacher 52% Child 22% ? 26 %

If no:

d) Do you wish that the teacher would ask you to help the other kids once in a while?

Yes 42% No 20% ? 38%

e) Why do you think that the teacher hasn't asked you to help the other kids?

? 79% --21%

10. Has the teacher ever asked one of your classmates to help you with your work?

Yes 73% No 27%

11. Would you like the teacher to ask other kids to work with you more or less than she does?

More 15% Less 67% ? 18%

12. Do you ever feel that too many people are looking at your work during IPI time?

No 48% Yes 23% ?18%

13. Would you rather work by yourself or do you like it better when the teacher works with you?

Teacher 52% Self 31% ? 17%

14. Would you rather work with the teacher or one of your classmates?

Teacher 64% Classmate 28% ? 8%

The Separate Level Approach

15. Sometimes the teacher will ask you to work on a unit that is an A, B, C, or D. What do you think these letters mean?

    Don't know 23%   Your level 48%   What you need 29%

16. What letter does the teacher usually prescribe for you?

    93% were correct in level

17 What letter does the teacher prescribe for most of the kids?

    88% were correct in level

18. What letter do you like the teacher to prescribe for you the most?

    14% were higher   77% were the same   9% were lower

19. Do you like working at your own prescription while some of the other kids are working at something different?

    Yes 76%   NO 12%   ? 12%

20. Would you like it better if all of the kids worked at the same thing during IPI like you do in other subjects?

    Yes 38%   No 40%   ? 22%

General Information

21. Do you think that IPI is too easy for you?

    Yes 23%   No 62%   ? 15%

22. Do you ever think that IPI is too hard for you?

    Yes 38%   No 37%   ? 25%

23. Would you like to use IPI next year or would you rather learn Arithmetic some other way?

    IPI 68%   Other 11%   ? 21%

24. Do you feel that you are learning more or less in IPI than in your other subjects?

    More 69%   Less 6%   ? 25%

25. Do you wish that you would get a grade on your report card in Arithmetic like the other kids do that don't take IPI?

    Yes 73%   No 15%   ? 12%

PLEASE RATE AND COMMENT ON THE FOLLOWING ASPECTS OF IPI MATHEMATICS:
Please check one (1) response.

1. IPI mathematics for the above average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor
10	2			

Please comment:

2. IPI mathematics for the average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor
11	1	1		

Please comment:

3. IPI mathematics for the below average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor
10	2	1		

Please comment:

	Excellent	Quite Good	Adequate	Not Too Good	Poor	Please Comment
Teacher's Instructional Role	10	3				
Aide's Role	13					
Classroom Atmosphere for Teachers	12	1				
Classroom Atmosphere for Pupil	10	3				
The Training and Preparation of Teachers	10	1	2			
Planning Sessions	11	1	1			
Discipline	13					
Level of Children's Motivation	12	1				

5. The instructional materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor
9	3	1		

If you were asked for one improvement to be made on the instructional materials, your request would be to ...

6. The testing materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor
11	2			

If you were asked for the single most important improvement to be made in the testing materials, your request would be to ...

7. The demands on an IPI teacher are

2 Above and beyond the call of duty
9 More than previous demands
2 Equal to previous demands
______ Less than previous demands
______ Much less than previous demands

How do you feel about these demands?

8. If you were given the choice, would you have IPI math seminars next year?

10 Yes
2 No
1 Uncertain

Please comment:

BASED ON YOUR FEELINGS, WOULD YOU PLEASE COMPLETE AND COMMENT ON THE FOLLOWING SENTENCES.

9. When IPI mathematics was first introduced in my school, I felt.....

Insecure	5
Uncertain	4
Excited	4

10. Now that I've had some experience with IPI math, I feel...........

Still excited	3
Tired	1
Convinced	8

11. I find teaching in IPI classes to be ...

Tremendous	2
Hard work	6
Rewarding	5

12. The problems I find in teaching IPI are...

Time	11
Planning	2

TEACHER ATTITUDE SURVEY

I.P.I

One of the concerns of our I.P.I. project is teacher attitude toward I.P.I. Would you recall how you felt prior to the workshop in August? Would you ring the number on the rating line below which best assessed your feelings at that time toward participation:

Strong Reservations
Very Enthusiastic

/ / / / 1 / 6 / 2 / 3
1 2 3 4 5 6 7

TEACHER ATTITUDE SURVEY

I.P.I.

Please indicate below your attitude toward I.P.I. following the Teacher Training workshop by ringing the number on the rating line that best assesses your feeling toward the project:

Strong Reservations
Very Enthusiastic

/ / / / 1 / 1 / 5 / 6
1 2 3 4 5 6 7

APPENDIX A

IPI Mathematics Placement Test

Level B

Revised Developmental Edition, based upon material prepared under the direction of Richard Cox, the Testing and Evaluation Staff, LRDC. University of Pittsburgh. Copyright 1968, 1967 by Meredith Corporation. All rights reserved. Printed in the United States.

me ______________________ Date __________
ass ______________________ Number __________

What number comes just before 2? Write the number. Do the rest of the problems the same way.

Sample
1, 2

SAMPLE

____, 40   ____, 98   ____, 33

What number comes just after 2? Write the number. Do the rest of the problems the same way.

Sample
2, 3

59, ____   99, ____

me ______________________ Date __________
ass ______________________ Number __________

Ring the smallest number in each box.

16	19	15

96	69	99

47	67	57

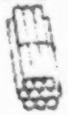
SAMPLE

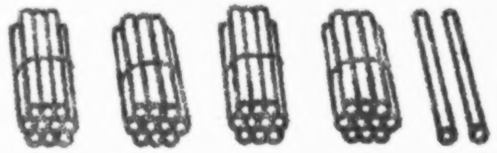
Write > or < to show whether the first number is greater or lesser.

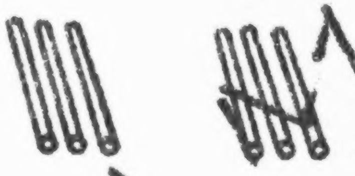
16 ○ 61

98 ○ 89

Name ______ Date ______
Class ______ Number ______

Write the number of tens and ones.
(Each  has ten sticks.)


___ tens and ___ ones


___ tens and ___ ones

Look at the underlined number. Ring tens if the number is in the tens place. Ring ones if the number is in the ones place.

75	tens	ones
20	tens	ones
70	tens	ones

SAMPLE

Date ______
Number ______

Add or subtract.

$$\begin{array}{r} 2 \\ +\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ +\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 2 \\ +\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ -\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ -\ 6 \\ \hline \end{array}$$

$3 + 3 =$ ___ $10 - 6 =$ ___

Write = or ≠ in the circle.

$3 + 7 \bigcirc 9$ $12 - 6 \bigcirc 6$

SAMPLE

ss ____________ Number ________

Ring the answer.

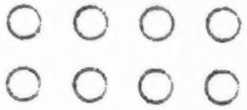
What is each part of a ruler called?

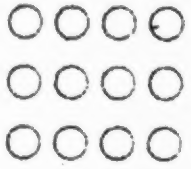
a foot   an inch   a yard

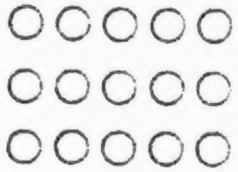
How many rulers put together make one yardstick?

two   three   four

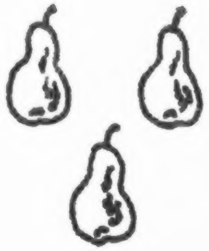
Ring one dozen.

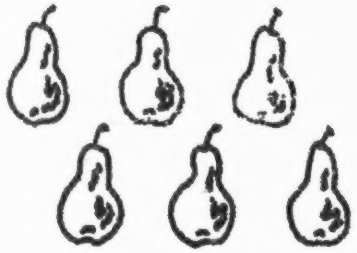






Ring one-half dozen.

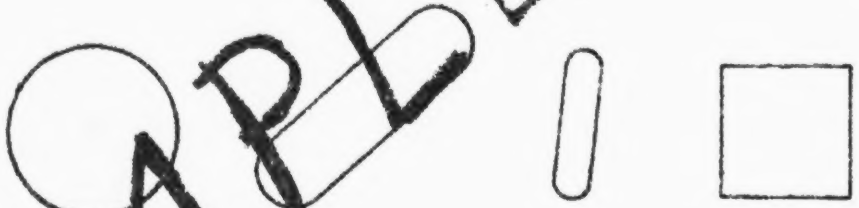




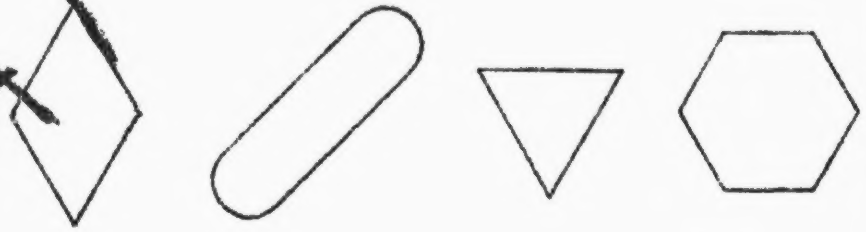
ass ____________ Number ________

In each row, mark the figure that is named by your teacher.

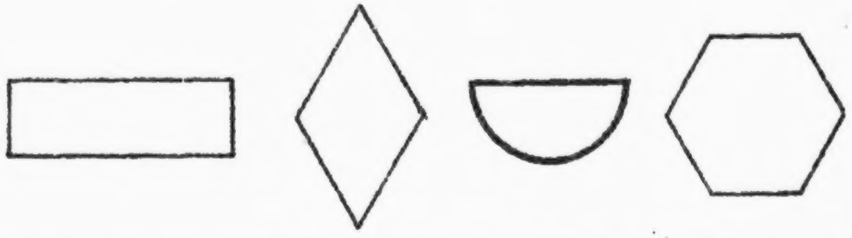
circle



triangle



rectangle



Draw a square.

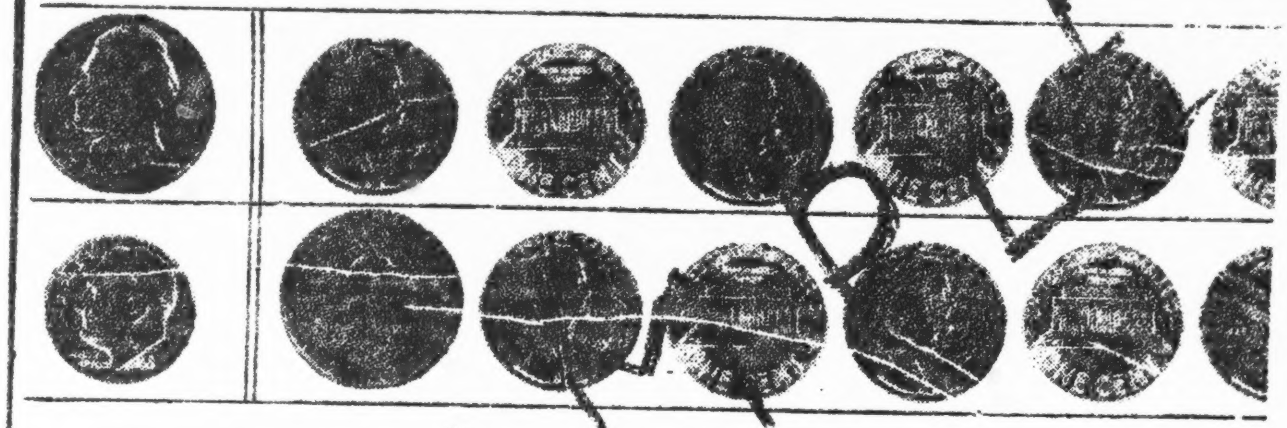
Draw a triangle.

SAMPLE

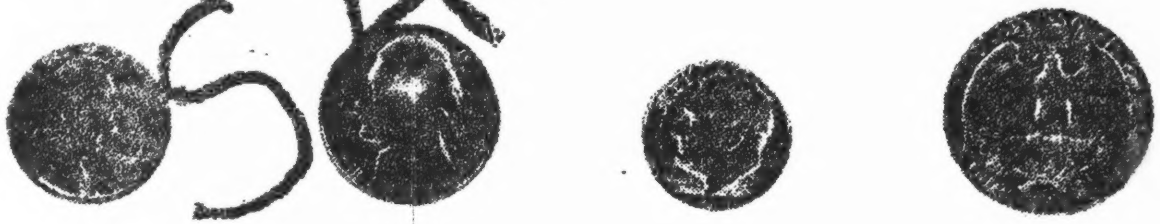
SAMPLE

ame ______________________ Date ____________
lass ______________________ Number ____________

In each row, ring the coins that match the amount in the box.

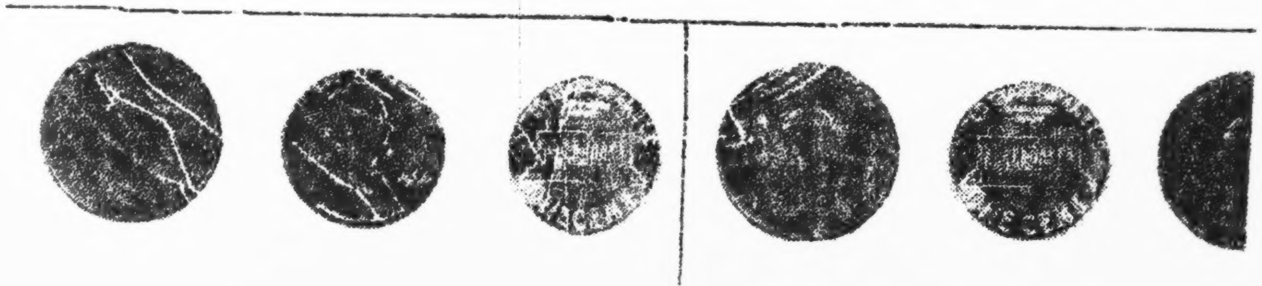


Mark the quarter.



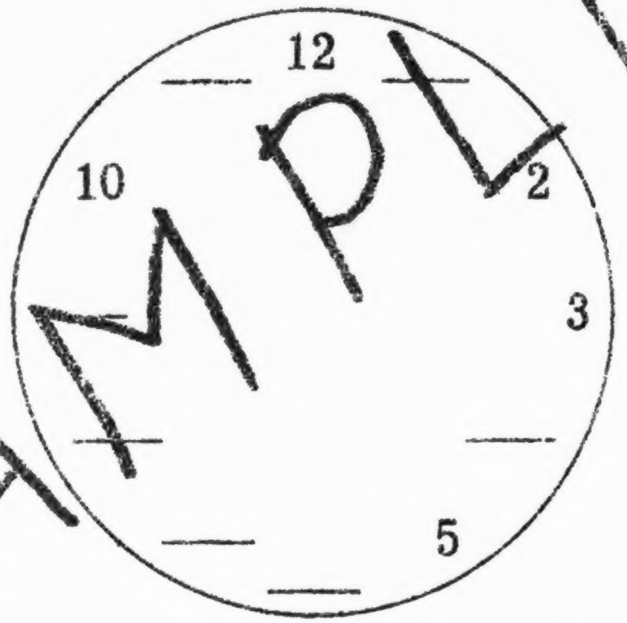
SAMPLE

Write the number that tells how much money.



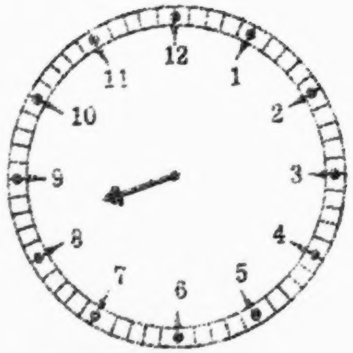
______________________ Date ____________
______________________ Number ____________

Write the missing numbers on the clock face.



SAMPLE

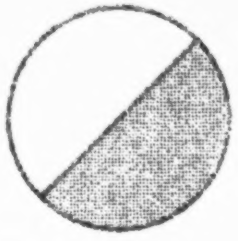
The little hand shows

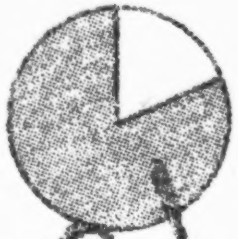


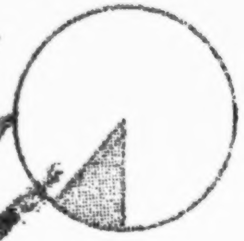
after _____ o'clock and

Class ______________________ Number ____________

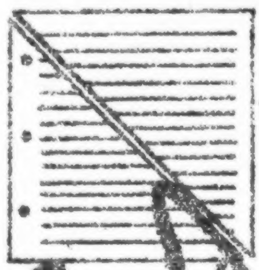
Mark the circle that is half shaded.

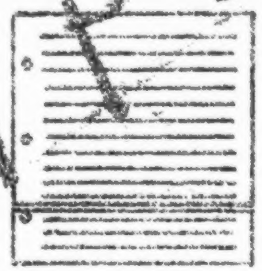


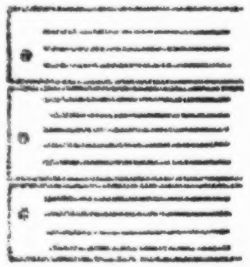




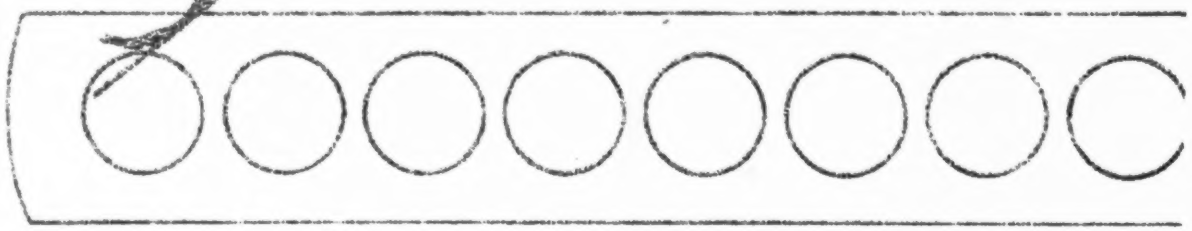
Mark the page that has been cut in half.

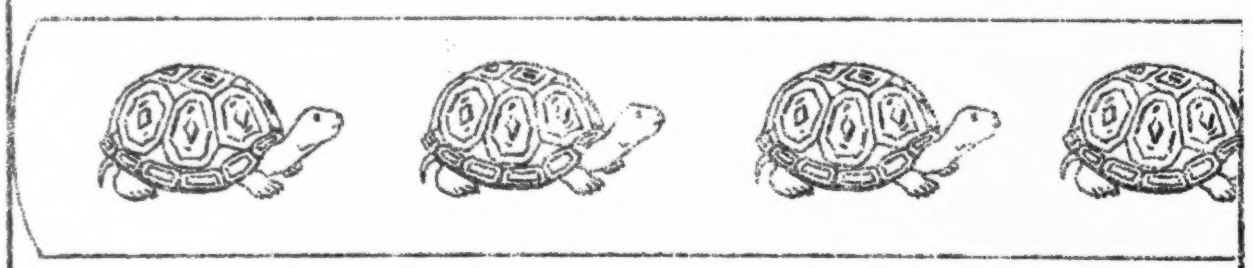


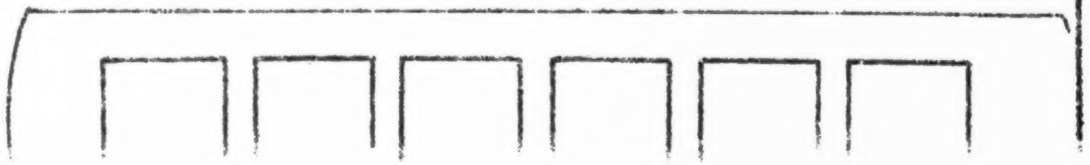




In each row, ring half of each set.





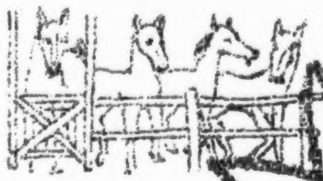


SAMPLE

lass ______________________ Number ____________

Ring the answer.

Farmer Joe had 1 horse in his corral and 3 horses outside the corral. How many horses did farmer Joe have?

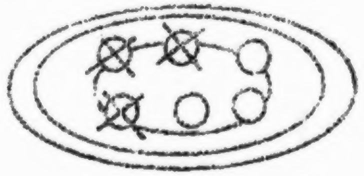


2 3 4 5

Mary had 8 candles lit on her birthday cake She blew out 3 of them. How many candles were still lit?

3 5 8 9

There were 6 cookies on the plate. Judy ate 3 of them. How many cookies were left?



6 4 3 2

SAMPLE

APPENDIX B

Sample IPI Level B - Numeration

Pre-Test for Skills 1, 2, 6 and 8

and

Post-Test for Skills 4, 5, 7 and 10

ipi MATHEMATICS PRE-TEST

Name ______________________ Date ______________________
Class ______________________ Number ______________________

LEVEL B, NUMERATION (01)

S

TL.
8
NO. O PTS.
7
6
5
4
3
2
1

Numeration: Directs student to put into sequence, write, count, compare, and read numbers from 1 to 100.

Ring the number that is named by the word.

nine 6 4 10 9	six 10 5 6 3
ten 10 2 5 6	four 2 4 5 7
five 9 6 5 4	eight 6 8 10 7
seven 5 7 9 8	zero 8 9 7 0

Revised Developmental Edition, based upon material prepared under the direction of Richard Cox, the Testing and Evaluation Staff, LRDC, University of Pittsburgh.
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B NUMERATION (01) PRE-TEST

SKILL

TL. PTS.	
2	100
NO. OF PTS.	%
1	50

Student: This is an oral test.

Teacher: Ask the student to count by 10's from 10 to 60, and from 40 to 100.

SKILL

TL. PTS.	
4	100%
NO. OF PTS.	%
3	75
2	50
1	25

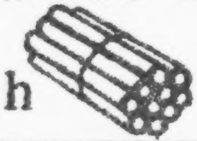
Student: This is an oral test.

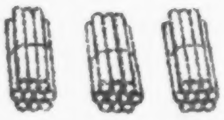
Teacher: Ask the student to count by 1's from 1 to 25; to count by 1's from 34 to 67; to count by 1's from 68 to 85; and to count by 1's from 89 to 100.

B NUMERATION (01) PRE-TEST SKILL 6

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

Write the numbers to tell how many sticks are in each row.

(Each  has 10 sticks.)



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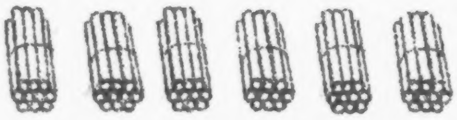

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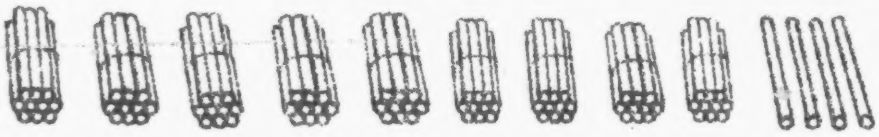
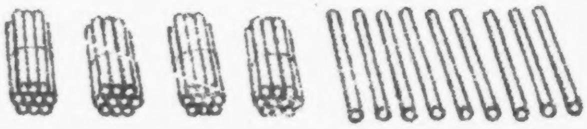
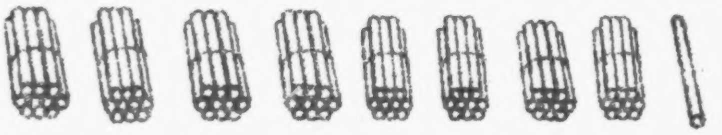


______



______



______

B NUMERATION (01) PRE-TEST

SKILL 8

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

In each box, ring the largest number.

63 34 65

56 41 38

62 78 77

In each box, ring the smallest number.

11 21 15

51 48 72

SKILL 9

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

Write > or < in each circle.

19 ○ 27

16 ○ 61

33 ○ 30

59 ○ 58

68 ○ 86

B NUMERATION (01) POST-TEST

SKIL

TL. PT
4
NO. OF PTS.
3
2
1

Student: This is an oral test.

Teacher: Point to the listed numbers on the chart and ask the student to "Read these numbers, starting here and ending here."

From 8 to 21
From 32 to 48
From 51 to 69
From 73 to 92

~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	~~7~~	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

B NUMERATION (01) POST-TEST SKIL

TL. P
10
NO. OF PTS.
9
8
7
6
5
4
3
2
1

Count from 1 to 100, and write in the numbers.

B NUMERATION (01) POST-TEST SKIL

TL. PT
10
NO. OF PTS.
9
8
7
6
5
4
3
2
1

Write the number that comes just after each number.

82, ____

57, ____

39, ____

63, ____

95, ____

Write the number that comes just before each number.

____ , 22

____ , 46

____ , 74

____ , 19

____ , 93

B NUMERATION (01) POST-TEST SKILL

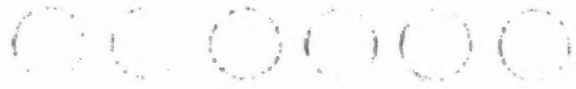
TL. PTS
5
NO. OF PTS.
4
3
2
1

Count from the arrows and mark the ojbect named by the words.

sixth star ——→

second square ——→

first dot ——→

third circle ——→


fourth triangle ——→

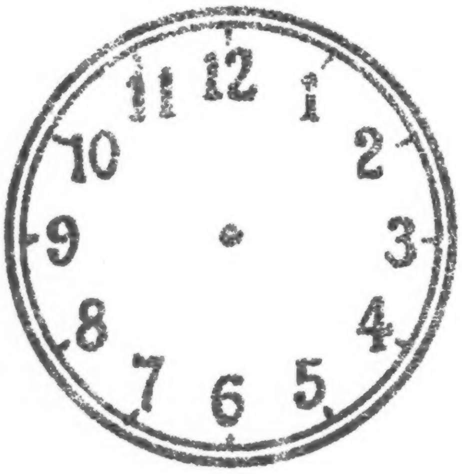
APPENDIX C

Sample of a Curriculum Imbedded Test
for
Level B - Time - Skill One, page 3

CET I

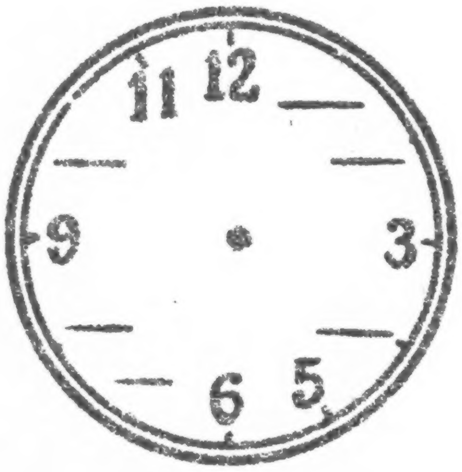
Your teacher will give you this test. Your teacher will point to five numbers on the clock face and you will read them.

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20



Write the missing numbers on the clock face.

TL. PTS.	
6	100%
NO. OF PTS.	%
5	83
4	67
3	50
2	33
1	17



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LEVEL	UNIT	SKILL	P
B	10	1	

APPENDIX D

Samples of Pupil Attitude Surveys

Test I
Test II

PUPIL ATTITUDE SURVEY

Test I

Questions for I P I and Control Groups

1. During the school day you work on different things like spelling or reading. What kind of things do you like working with the most ?

2. What kind of classwork do you least like, or dislike ?

3. What subject do you do best at ?

4. (Not applicable to 6th graders)
   What subject do you think that the teacher likes to teach the most ?

5. What subject is the most difficult or hardest for you to learn ?

6. Do you ever tell you Mother and Father about the things that you learn in school ?

   a) If yes: What subject do you tell them about the most ?

7. Do your parents ask you about the things that you are learning in school ?

PUPI.L ATTITUDE SURVEY
Test I

8. What subject would your parents like you to do better in?

9. What subject do you wish that you could do better in ?

10. (Exclude First Graders)

Do you like working on any subjects this year better than you liked working on them last year?
a) if yes, : Which ones?

11. Do you wish that you didn't have to go to school?

12. Have you ever thought that you would like to go to college when you are ready ?

13. Do your parents ever talk about your going to college ?

14. (Exclude First Graders)
How are you doing in Arithmetic this year compared with last year?
a) Better _______
b) About the same _____-
c) Worse _________

15. Do you worry at all about failing Arithmetic?

16. Would you like the teacher to spend more time just talking to you while you're doing your Arithmetic than she does with some of the other kids ?

17. Do you know the kids in your class that are better at arithmetic then the other kids?

18. Do you know the kids in your class that have the most trouble or do poorly in arithmetic ?

19. How well are you doing in arithmetic ?

a) better than most kids ________

b) average ________.

c) worse than most kids __________

20. Does the teacher think that you are doing well in arithmetic?

21. While you are working on all the different subjects that you study during the school day, when do you get a chance to talk most to the teacher ?

22. Do you like to work at home on things that you are learning in school?

23. Are there any things that you learn in school that you would like to take home to work on ?

a) if yes: What ?

γ

PUPIL ATTITUDE SURVEY

Test II

Questions For I P I Group Only

Freedom of Movement

1. When you're working with I P I you often have to move around to other parts of the classroom. Do you like doing this ?

2. Sometimes while you're working with your booklet at your desk the other kids are moving aroung the room or talking. Does this make it harder for you to do your own work ?

Materials Used In I P I

3. Sometimes when the teacher gives you a prescription you work in your booklet or with devices and sometimes the teacher or someone else works with you. What do you like to do best ?

4. Sometimes the teacher will ask you to work with a device. Why does the teacher ask kids to work with devices ?

5. Are there some devices that you like best to work with ?

   a) If yes : Which ones ?

6. Are there some devices that you don't like to work with ?

7. Do you wish that you could do more or less work with devices than you already do ?

8. Do the devices help you to understand things or do they confuse you ?

PUPIL ATTITUDE SURVEY

Test II

Questions for I P I Group Only

Tutorial Method

9. Has the teacher ever asked you to help one of your classmates with their work ?

    If Yes:

    a) Do you wish that the teacher would ask you to help other kids more than she does or less than she does ?

    b) Why do you think that the teacher asks you to help your classmates ?

    c) Do you think that most of the kids like it when you help them or do they wish that the teacher wouldn't ask you to help them ?

    If No:

    d) Do you wish that the teacher would ask you to help the other kids once in a while ?

    e) Why do you think that the teacher hasn't asked you to help the other kids ?

10. Has the teacher ever asked one of your classmates to help you with your work ?

11. Would you like the teacher to ask other kids to work with you more or less than she does ?

12. Do you ever feel that too many people are looking at your work during I P I time ?

13. Would you rather work by yourself or do you like it better when the teacher works with you ?

14. Would you rather work with the teacher or with one of your classmates ?

PUPIL ATIITUDE SURVEY
Test II

Questions for I P I Group Only

The Separate Level Approach

15. Sometimes the teacher will tell you to work on a unit that is an A, B, C or D. What do you think all these letters mean ?

16. What letter does the teacher usually prescribe for you ?

17. What letter does the teacher prescribe for most of the kids ?

18. What letter do you like the teacher to prescribe for you the most ?

19. Do you like working at your own prescription while some of the other kids are working at something different ?

20. Would you like it better if all the kids worked at the same thing during I P I like you do with other subjects ?

General Information

21. Do you ever think that I P I is too easy for you ?

22. Do you ever think that I P I is too hard for you ?

23. Would you like to use I P I next year or would you rather learn Arithmetic some other way ?

24. Do you feel that you are learning more or less in I P I than in your other subjects ?

25. Do you wish that you would get a grade on your report card in Arithmetic like the other kids do that don't take I P I ?

APPENDIX E

Teacher Information Concerning
IPI
as an Instructional System

Research for Better Schools, Inc.
Philadelphia, Pennsylvania

PLEASE RATE AND COMMENT ON THE FOLLOWING ASPECTS OF IPI MATHEMATICS:
Please check one (1) response.

1. IPI mathematics for the above average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

2. IPI mathematics for the average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

3. IPI mathematics for the below average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

4. How do you rate the following aspects of IPI math? Please check one (1) response.

	Excellent	Quite Good	Adequate	Not Too Good	Poor	Please Comment
a. Teacher's Instructional Role						
b. Aide's Role						
c. Classroom Atmosphere for Teachers						
d. Classroom Atmosphere for Pupil						
e. The Training and Preparation of Teachers						
f. Planning Sessions						
g. Discipline						
h. Level of Children's Motivation						

5. The instructional materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor

If you were asked for one improvement to be made on the instructional materials, your request would be to ...

6. The testing materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor

If you were asked for the single most important improvement to be made in the testing materials, your request would be to ...

7. The demands on an IPI teacher are

______ Above and beyond the call of duty

______ More than previous demands

______ Equal to previous demands

______ Less than previous demands

______ Much less than previous demands

How do you feel about these demands?

8. If you were given the choice, would you have IPI math seminars next year?

______ Yes

______ No

______ Uncertain

Please comment:

BASED ON YOUR FEELINGS, WOULD YOU PLEASE COMPLETE AND COMMENT ON THE FOLLOWING SENTENCES.

9. When IPI mathematics was first introduced in my school, I felt.....

10. Now that I've had some experience with IPI math, I feel............

11. I find teaching in IPI classes to be ...

12. The problems I find in teaching IPI are...

APPENDIX F

Samples of Teacher Surveys concerning the IPI Training Sessions and Attitude toward IPI

TEACHER ATTITUDE SURVEY

I.P.I

One of the concerns of our I.P.I. project is teacher attitude toward I.P.I. Would you recall how you felt prior to the workshop in August? Would you ring the number on the rating line below which best assessed your feelings at that time toward participation:

Strong Reservations — Very Enthusiastic

/ / / / / / /

1 2 3 4 5 6 7

TEACHER ATTITUDE SURVEY

I.P.I.

Please indicate below your attitude toward I.P.I. following the Teacher Training workshop by ringing the number on the rating line that best assesses your feeling toward the project:

Strong Reservations — Very Enthusiastic

/ / / / / / /

1 2 3 4 5 6 7

APPENDIX G

A Manual for Initiating IPI in a School

INTRODUCING IPI INTO YOUR SCHOOL

Prepared by the staff of the

Broad Street Elementary School
Horseheads Central School District
Horseheads, New York 14845

William F. Meade, Principal
Lawrence M. Griffin, Supervisor of Elementary Education
Harry Q. Packer, Superintendent of Schools

This Report was written in conjunction with a Project Funded by

The Division of Research and the Center for Innovation
State Education Department
Albany, N. Y.

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PREFACE

Individually Prescribed Instruction (IPI) is a system of Individualized Instruction. It is a way to individualize instruction that really works. Because it has proven so successful in field trials and the over 300 schools presently using it, many schools will soon be clamoring to get on the band wagon.

This guide was prepared for such a school. It gives the inside information on the problems one school had in implementing IPI in 1968-69. In this guide the reader will find suggestions that may help implement an IPI program. All data is taken from the experiences found in Horseheads Central School District's efforts to implement IPI mathematics in the Broad Street Elementary School.

Any program of individualization is hard work. If the experiences gained by Horseheads in this project is any indication, the effort is well spent. The district is pleased with IPI. It is also delighted with the spin-off benefits from the process of implementing IPI. The side benefits are equal to the main project.

Best of wishes in your efforts to individualize instruction.

L.M.G.

CHAPTER I

IPI - One Individualized Approach to Learning Mathematics

Students in several hundred schools across the country are following a new approach to learning mathematics. Each of these children will be able to proceed, not as a class, but as individuals through a sequenced program of mathematics skills tailored to his own needs.

This program is called INDIVIDUALLY PRESCRIBED INSTRUCTION. It is based on the premise that no two students are ready to learn the same thing at the same time or at the same rate. Thus it attempts to provide each child with the opportunity to proceed according to his own ability, interest and best way of learning. It further allows a student to exempt that which he already knows and to master those skills in which he shows a weakness.

For years, those of us in education have sought ways to give attention to individual differences within the content of the formal class setting. In the traditional classroom, where students were assigned largely by age and taught as a group, formation of smaller groups in reading and mathematics has been the typical attempt to individualize teaching. This approach has tended to limit the gifted student, who is capable of moving much faster with less drill, and the less gifted who needs more individual attention. Many changes in structure have been advanced as a means of placing children in more appropriate learning groups, among which are team teaching, non-graded groupings, closed circuit television, and independent study contracts. However, in most cases, the basic curriculum has not been changed to offer an individual course of study for each child.

IPI offers a complete instructional system which includes sequenced learning materials, testing instruments and constant teacher evaluation of students which allows each member of a class to proceed toward specified learning objectives at different rates and ways of learning best suited to him. It is entirely possible in this system for each of the students in a building to be following a different course of study.

Where IPI Originated

IPI was created by the Learning Branch and Development Center at the University of Pittsburgh. It was developed by Drs. Glaser, Bolvin and Lindvall, a team of psychologists and curriculum specialists at the Center. The experimental project was initiated in the 1963-64 school year in the Oakleaf Elementary School in the Baldwin-Whitehall Public Schools of suburban Pittsburgh after a series of exploratory studies began in 1961-62.

Sine 1964, the program has been expanded to 25 schools in the nation who are field testing its materials and concepts. In 1968, 75 more schools were selected for operational programs in mathematics. Such a vast undertaking requires well based techniques for control and evaluation.

Research for Better Schools, Inc., a Regional Research Laboratory funded under ESEA IV, has the task of determining "How does this innovation work in the pilot schools?" The five major kinds of data collected to answer this question are: (1) the materials, (2) the pupils, (3) the teaching staff, (4) the community setting, and (5) the Individually Prescribed Instruction concept as an educational system.

Data is collected frequently from the participating schools, fed into computers, compared to data in non-participating control schools and returned to the Pittsburgh Research and Development Center. Here recommended changes are made to continually improve the system.

The Specifics of IPI

To date, courses of study are being developed in mathematics, reading, social studies, English and science. Mathematics, however is the only course which has been released for limited operational use.

IPI basically consists of the teacher planning and conducting with each student a program of studies which is tailored to his own learning needs and his characteristics as a learner. In continuing to search for ways to adapt instruction to the individual such factors have been taken into account as rate of learning, amount of practice, and, to some extent, preference for mode of instruction.

The rate of speed at which a child progresses depends on his own capacities. The child places himself on the continuum by taking both placement tests and pretests. The continuum consists of curriculum material arranged in a sequential order. Assignments are given as a prescription (an individual daily lesson plan) to fit his needs. Student mastery of the curriculum is judged by curriculum-embedded tests and pretests. A level of 85% or better performance is required on these tests before moving forward on the continuum.

In most cases, the child works independently, thus building a sense of responsibility and confidence. Successful experiences are built into the course of study. Soon, the child begins to realize that learning is a process which depends on his own participation and initiative.

IPI Learning Goals

IPI begins with a set of learning goals which are derived from six basic criteria.

1. Instruction must be based on carefully sequenced and detailed behavioral objectives which (a) tell exactly what must be done for mastery, (b) are grouped in meaningful streams of content, (c) are sequenced within streams so that each one builds on those preceding, (d) are grouped into meaningful sub-sequences or units.
2. Lesson materials must be geared exactly to the objectives and must allow for students to proceed independently.
3. A rather detailed provision for diagnosis of pupil skills and abilities and continuous monitoring of pupil prograss must be basic to the program.
4. Each pupil's work must be guided by written prescription prepared for his individual needs and interest.
5. The teacher's role must shift from that of imparting information to that of managing individual activities.

6. The activities and procedures must be pupil-oriented since success in any curriculum depends on the quality of experiences pupils have.

As an example, IPI mathematics is divided into 13 mathematical concepts such as numeration, addition, time, money and geometry. Within these concepts or skills, there are 418 specific and sequenced objectives grouped in 9 levels applicable to grades 1 - 8. Both the 13 skill areas and the behavioral objectives within each are sequenced at each level. Thus the student progresses through them in a logical orderly manner, leaving no gaps in his learning.

IPI is Based On Tests

A complete set of tests, an essential part of the IPI system, are provided to properly place students and evaluate their progress through the year. Included in the set are Placement Tests, Pretests, Posttests and Curriculum-embedded Tests.

The placement test is given at the beginning of each school year to determine at which level the student should begin in each of the 13 skill areas. The test, which shows both where additional work is needed and where it is not needed, is primarily a screening device. A student is considered to have placed in a unit at a given level if he has scored between 20% and 80% on this test.

Pretests follow the placement tests to provide a more detailed diagnosis of strengths and weaknesses within a unit identified for further work. It is on the basis of these tests that individual prescriptions are written. Posttests, similar to Pretests, are given to show mastery of units. Curriculum-embedded tests show a student's progress within a unit and are built into the daily or weekly work sheets. They show whether the student really understands the skills involved. In both Posttests and Curriculum-embedded tests the student must attain 85% before he goes on to a new unit of work.

Armed with the information gained from this testing, the teacher is able to write prescriptions which exactly match the student's needs. The increased amount of time devoted to testing is regained by more efficiently using remaining instructional time.

CHAPTER II

COMMITMENTS FOR PARTICIPATION IN IPI

Committing a District to Individualizing Instruction

The first step in adopting the IPI system, we feel, is a formal commitment on the part of the school district to the philosophy of individualizing instruction. This may already be included in your Board of Education statement of philosophy, but it goes beyond this. Board, Administration and staff should openly discuss the implications of such a philosophy and stand ready with ways to better implement it. Once commited, the search for better ways of individualizing begins.

At Horseheads, we started with a position paper on Individualizing Instruction which was used as the basis for our one-day Staff Conference on the day before school opened. Follow-up sessions are essential to the full development of commitment to such an approach and to the development of a plan of action. Introducing the IPI program to the staff could well be incorporated into these sessions. Interest in visiting a school which has initiated this program should be stimulated.

We found that a visit to an IPI school was the most significant step in developing enthusiasm for the IPI program. A group of administrators and teachers visited the McAnnulty Elementary School in the Baldwin-Whitehall School District outside of Pittsburgh, Pennsylvania. Their enthusiasm soon spread to others in our district and one elementary school asked to try the program.

Commitments to Research for Better Schools, Inc.

Research for Better Schools is still carrying out field testing and evaluation of the various subject areas being developed in the IPI system. Because of this, only a limited number of schools are being selected for the program. At this writing, a little over 200 schools are participating only in mathematics, while about 25 schools are using the program for other subject areas. Schools who wish to participate in the program, then, must apply to RBS.

A letter to Dr. Robert Scanlon, IPI Director, at the Research for Better Schools, Inc., 121 South Broad Street, Philadelphia, Pa., 19107 or a telephone call to 215-546-6050 will initiate the process of application. An application form must be completed. Since selection of schools is limited, competition is fairly high and those schools which best meet the requirements set for the program are the ones selected.

A basic part of this program is the use of Teacher Aides, and they are required for participation. The general rule of thumb is one aide for each 100 students. These Aides have to be trained and paid. Consequently they represent a major portion of the total cost of this program.

The building principal and his teachers must also be trained. RBS has set up a 2 week training session for administrators which is very comprehensive and worthwhile. The cost of this session is an obligation of the local district. Initial teacher training is accomplished in a workshop in the local school. A complete training course has been developed for this purpose, which the principal is trained to teach, and is well worth its cost. If this workshop is conducted during the summer or other vacation time, you may want to incur the cost of stipends.

Another major expense of the program is the cost of the IPI materials. Since the publisher has only a very limited market now, the cost of the materials is necessarily much higher than can be expected once the program is released for general use.

Research for Better Schools has established a comprehensive evaluation program for IPI. They are gathering data weekly from participating schools concerning materials, pupils, teaching staff, community setting and the IPI concept as an educational system. This data is being compiled and analyzed via computer in an attempt to determine how well the IPI system really works in the schools.

More specifically RBS is attempting to determine how well the materials do the job of helping pupils learn and how adaptable they are in meeting the varying needs of students. Samples of student work are sent at regular intervals for analysis. From the results of this analysis recommendations are made for improving the materials.

In the process of examining the materials, the student's response to the new approach is also studied. How the students react to the materials is important to making improvements in those materials. Yet, there is also a concern about whether the student learns more, quicker, without any undesirable side affects.

What happens to the teaching staff is also a cause for concern. Does the teacher need to be retrained and, if so, to what degree and in what ways? Indications are that retraining is definitely needed, and a training program has been devised. But, is this the best way to do it?

The cost of the program is obviously quite high in the controlled stages. Ways of reducing these costs are continually being sought through the analysis of the IPI system as a whole. Once the materials have been finalized and more schools are participating, it is anticipated that their cost will be reduced to the annual cost of a workbook. The needs for teaching staff and aides require more study because of their relatively high cost.

Although the cost of the evaluation of this program by RBS is now absorbed by them, you may want to set up some local controls. At Horseheads, we retained a research consultant for this purpose. The availability of such people and their prevailing fees will determine how much you need to budget for this if you decide to carry out serious local evaluation.

An estimation of the costs of this program is somewhat precarious since the price of materials changes each year. However, for the school year 1969-70, cost per pupil for materials is anticipated to be $12.00 An estimate of costs for 1969-70 would look like the following if you were to put in the complete recommended program.

8 Aides	$20.160
Materials for 700 pupils	8,400
Evaluation Consultant	1,500
Floating Teacher	11,000
Stipends for 2-week workshop for teachers (24) assuming 1/20 rate	12,000
1-week training stipends for Aides	480
Training materials	350
3-week training for Principal	400
Allowance needed for supplementary materials	300
	$54,590.

More will be said in chapters 3 and 5 about staffing and inservice training which could reduce the costs as outlined above. We say this because we want you to continue reading, if not to satisfy our egos, to get back out of this whatever it cost you in time and money to obtain this handbook.

CHAPTER III

Personnel for IPI

The most important component in IPI as in any program is the Teacher. An outstanding teacher will make almost any program work. In IPI even a less than adequate teacher can present a reasonable program. An outstanding teacher can present a superb program.

The teacher's role in an individualized program is much different than the "spouter" of information formerly thought of as the standard role. In IPI, a special type of individualized instruction, the teacher's role is a diagnosticia and manager of learning. Her/him in this role must find time to:

1. Diagnose students strengths and weaknesses.
2. Write student prescriptions.
3. Prepare new and/or revise materials (tapes, worksheets, etc.)
4. Plan individual programs with teams.
5. Provide individual students with assistance.
6. Work with small and large groups of students (seminars).
7. Direct the work of the teacher aides.
8. Study students previous work for future planning.
9. Remain warm and friendly in dealings with children.
10. Study new ideas and directions in mathematics.
11. Evaluate materials and procedures used in IPI.
12. Participate in inservice training workshops.

The teacher aides are a most important part of the IPI program. They are the one component that make it possible for a teacher's role given above to be implemented. The role of the teacher's Aides is:

1. Classroom functions
   a. Grades 1 - 2 - 3
      (1) Scoring and recording all placement tests.
      (2) Scoring and recording all unit tests, making breakdown of the tests by skills, prescription sheets.
      (3) Scoring and recording all student worksheets.
      (4) Obtaining and placing all worksheets in student folders.
      (5) Locating sound discs for pupils and assisting them with sound discs and machines.
         (a) Scoring and recording all work pages supplemental to the sound discs.
      (6) Replacing and duplicating continuum materials.
   b. Grades 4 - 5 - 6
      (similar activities, except less help and correction for pupils).

2. Functions supplemental to the classroom - all grades.
   a. Keys and prescription folders.
      (1) Making keys for teachers.
   b. Work pages continuum.
      (1) Keeping inventory, duplication, ordering, numbering in proper sequence and storing the pages.
   c. Weekly Reports
      (1) Current status of work with the units for use in teacher conferences.

- d. Filing Work.
    - (1) All tests numbered in order taken and filed in each student's test file.
    - (2) Completed students' prescription sheets placed in students' folder.

3. Functions relevant to the study.
    - a. Recording for computer use information regarding -
        - (1) Tests taken, scores, skills worked, pages done in the skills, days worked, order in which the unit skills were worked.
    - b. Specific weekly reports for local project, LRDC and RBS projects, (recording information for)
    - c. Taking inventory and ordering materials.
    - d. Preparing dissemination materials.
    - e. Scoring, recording and graphing achievement tests and IQ tests.

It is most improtant that these personnel - teachers and teacher aides be able to work together for the benefit of each - and more important the children. It was found that in order to foster this it was best to involve the aides in the inservice program for teachers. This gives both a common understanding of the program and also the role each is to play.

If the aides are to be readily accepted by teachers a schedule for the aides must be created so that they can be most effectively used. Horseheads found that this necessitated a schedule for mathematics in the school. The schedule gave 50 minutes per grade level as maximum time for IPI mathematics.

As in any program it is necessary to supervise the teachers and aides. It was found that the supervision was primarily in the nature of assistance with techniques and procedures. The teachers were so enthusiastic and learned so much about good teaching from IPI's procedures that no major problems occured.

CHAPTER IV

Building Implementation

The IPI mathematics program can be implemented into any building. Certain physical facilities make the job easier, but with only minor adjustments the program will fit into an extremely traditionally built building.

The Broad Street Elementary School was not built just for this program. The building was approximately 10 years old at the time of implementation. No structural changes were made. However, the ideal situation would be to have two or more large material centers. At Broad Street a store room for custodial supplies was converted for this purpose.

It was necessary to construct storage shelves for materials. Specifications for such shelving were obtained from RBS and our own maintenance staff built them at minor cost.

When planning space for IPI, it is wise to plan space and time for teacher planning sessions. If efficient use of teacher time, aides and student effort is to be realized, considerable planning must be done by teacher groups. Every effort should be made by the building principal to arrange building schedules to make this planning time available during the school day. Broad Street did not find this possible in every case so that many of the sessions were scheduled after school.

A major concern in IPI is keeping accurate records. It is vital that up-to-date data be available so that all teachers know precisely where each child is at all times. This is also a valuable addition to the evaluation and reporting process. It is importnat that procedures are established for this record keeping. Suggested techniques are supplied during the administrative training sessions.

CHAPTER V

Inservice Training

The Inservice Training is crucial to the success of the IPI program. It provides the understanding and skills required in order to properly implement the IPI program. As mentioned earlier it consists of 35 hours of individualized programmed instruction taught from materials prepared by RBS.

The major areas of training include a section on what individualized instruction is, and how IPI fits into the definition, a section on behavioral objectives and the IPI continuum, a comprehensive section on diagnosis of student achievement, and a major section on the IPI techniques of prescription. It is a very complete and comprehensive program.

It is very important that the sessions of training for teachers and teacher aides be conducted simultaneously. The need for teachers and teacher aides to study, learn and work together is so important that it is strongly recommended as a must.

The training programs follow the same general procedures that the staff will later use with the students -- pretest, general instructional procedures and posttest. Many of the instructional procedures are simulation type experiences.

CHAPTER VI

To The Teacher

To try and fail is better than not to have tried at all. This saying is always appropriate and it is applicable to IPI. You should not expect to fail but you will make mistakes which are common to all new endeavors. The chance are, however, that you will be right much more often than you will be wrong. You just have to place faith in your preparation for the task and your own good judgment.

As part of the IPI package, you will receive a very thorough training course to prepare you for teaching mathematics. It will acquaint you with the total system, and a complete system it is. It is not our purpose here to preview what you will learn in the training course, but rather to pass along some of the things we have discovered during our first year in the program.

GET ACQUAINTED WITH THE BOOKLETS. The training course generally acquaints you with all of the materials which you will utilize, all of the procedures you will follow, and will give you practice in their use. However, there is not time to become thoroughly acquainted with all of the STS booklets you are likely to prescribe in your class. We have found that it is a distinct advantage to work through these booklets before you assign them, to learn exactly what is included and how it is taught. This will help to avoid the student's confusion when he is faced with a difference in your way of teaching a particular skill and the IPI way.

Becoming thoroughly acquainted with these materials may also suggest more ways to approach their accomplishments by students. As part of your training course, you will receive a bibliography of supplementary materials which have been found helpful by teachers. You may get new ideas about how to use these or about other materials which would be helpful. At any rate, try to anticipate what your needs will be and then START COLLECTING SUPPLEMENTARY MATERIALS FROM WHEREVER YOU CAN. Look also for something in which to keep them.

It will save time and provide a greater wealth of materials if you share this task woth others at or near the grade level of your class. Sharing these materials probably can best be accomplished through some system of central storage. This could be in a central storeroom with the STS booklets, in lockers or shelving near your rooms, or perhaps in one of your rooms.

START A SUPPLEMENTAL MATERIALS NOTEBOOK. To aid you in making optimal use of these materials in your prescription writing, you will find it tremendously helpful to start a loose leaf motebook. List in the notebook all of the materials available to you according to the various skill areas of the program. (Can we get a sample page to show how this works?) We have found that our sixth graders can make use of the notebook when they begin to write some of their own prescriptions. You will want to add new items to these lists continually as you acquire new materials or discover more ways of using what you have.

ESTABLISH YOUR WORKING RELATIONSHIP WITH YOUR AIDE EARLY. Teacher aides are absolutely essential to the success of the IPI mathematics program. Since most of us have never taught with another person in our room, getting used to an aide may create a problem for us. The role of the aides will be defined quite clearly in the training program designed especially for them. Yet, each aide will still have to discover how best she operates in each classroom with each teacher. If you will take the time right at the beginning to become well acquainted and to establish the procedures for your room, you will avoid any big misunderstandings later.

Essentially, the aide's role is to correct work and take care of the records required in the program. However, it is inevitable that she will soon become aware of the mistakes the children are making, the children will ask her questions, and that she will answer the questions. It is at this point that teachers will become concerned about what could be construed as "teaching" by the aides. By anticipating that this will happen, you can provide for procedures acceptable to you. In so doing, you will avoid the possibility of a confrontation which will be distasteful for both of you.

We have found that it works best to encourage the aide to report to you anything that arises. This can best be accomplished by writing notes to you on the booklet the aide has corrected. By writing down what she has observed, what the child has asked, and what she has answered if you agreed that she should answer, your lines of communication remain open. You will receive valuable information and at the same time you will know if the aide has unwittingly given incorrect information to the child. It should be mentioned here that your aide will need a place to work too. A chair and a small table works very nicely. We place ours in a convenient spot at the opposite end of the room from the teacher's desk.

DON'T RUSH THE CHILDREN INTO THE PROGRAM. If your school has taught like most, this program will be completely different from anything your children have experienced in the past. It has a new language, a freedom of movement, and a style of working which is completely foreign to traditional methods. Therefore you must spend time preparing them for this new experience.

If you have any doubts about how basic this need is, may we cite one instance to prove the point. At the conclusion of our first year in the IPI mathematics program we surveyed the whole student body to get their reaction to school in general and to arithmetic in particular. We asked the children how they felt they were doing in arithmetic this year as compared to last year. The primary children in IPI sections more often than not told us that they were not taking arithmetic this year.

Our advice is to explain very carefully what IPI Mathematics is so that the children know they are still taking arithmetic. Along with this, don't be concerned about devoting several days to a few weeks in learning such things as the new vocabulary used in the program, the procedures which must be followed, the kinds of activities in which they will participate, and the names and meanings of the various labels on the materials which they will use. In short, the children must learn how they are to learn in this new program.

GROUPING. For years, the lines of battle have been drawn between the homogeneous camp and the heterogenous camp. Happily, this is not an issue in IPI mathematics. It matters not at all how the children are grouped most of the time since each one follows his own individual curriculum. However, there are times when a group of children may be found who have a similar problem. When this happens, that is the time to group them for as long as is needed to eliminate the problem.

It is interesting to note that large group instruction, in IPI mathematics, refers to a group of 8 - 12 children, while small group instruction refers to groups of 3 - 7. Regardless of how a classroom of children are originally grouped, it is entirely possible that a group with similar problems can be found which may originate from one or several different classrooms. As you become better acquainted with the program, interclass planning and sharing will emerge as a more important tool in the program.

Our experience shows that pairing of students works well and is liked by the students. The tendency is to assign a student who is doing well with a skill to one who is having difficulty with it. Don't overlook writing prescriptions for two children who are equally proficient in a particular skill. This gives children an opportunity to "help" others who might otherwise never be asked to do so. It also provides an opportunity for student interaction which obviously does not occur when students work individually. It is obvious too, that it is easier to find a small group of children with similar problems than it is to find a group of 5 - 10.

Occasionally you will find a child who does not utilize his time well or not at all. Pairing this child could provide the stimulus to get him going. You might want to keep an eye on the pair for awhile though, to be sure that it is working this way rather than there now being two children who are accomplishing nothing.

You willldiscover that there is some latitude allowed when deciding if a child should be allowed to continue even though he may not have quite achieved the minimum score allowed. When a teacher decides in favor of going on she labels the test with the term "teacher's judgment". We have found that you should not be afraid to exercise this option when judgment indicates that you should.

STUDENT CONTROL. The IPI program requires that the children move about quite a bit, both in the classroom and in the halls to pick up materials from central storage areas. This bit of information could be somewhat un-nerving to the teacher who has maintained a very quiet learning atmosphere in which children remain in their seats much of the day. Actually, the children adapt quite quickly to this new found freedom of movement and assume an acceptable degree of responsibility for themselves, even in the halls. We have experienced very little difficulty with allowing the children to go to the central storage areas by themselves.

Movement within the classroom can be a problem for some youngsters whose power of concentration is low. They may experience difficulty in completing their prescriptions in the STS booklets when others are going to the aides for scoring, to the teacher for prescriptions or wherever else they are required to go. When it becomes apparent that this is a significant factor in your room, some modifications might be in order. You may want to group these children in one part of the room with their backs to the rest of the group. You and the aide may have to work much more with children at their desks rather than at yours. You may want to give more consideration to controlling the amount and timing of movement in your planning and prescription writing. Indeed, you very well may conceive of several ingenious ways of solving this problem which you will want to share with us.

ODDS AND ENDS. As you might suspect, the greatest bottleneck to progress is scoring and prescribing. The scoring seems to be the bigger problem. Although this is supposed to be the aide's job, you may well find that it is in the best interests of the class to take time out to help score papers when there is a back-log. Otherwise, there will be too much of the children's time wasted in just waiting.

The perfect educational system has yet to be written. If you feel that something needs to be learned which is not included in the IPI program, then you should feel free to provide for it. After the first year, we find that we have scored low in computation on the Stanford Achievement test. This may well be a problem preceding IPI, but it is one with which we will have to reckon.

HOW ABOUT THE POOR PARENTS? Our parents were just getting used to the movement toward modern mathematics. Now they have to make another adjustment to IPI. Although this matter is dealt with elsewhere, it is worth mentioning here As a classroom teacher, you will want to spend several sessions, if necessary, with the parents of your charges to acquaint them firsthand with the program and its materials. Generally speaking, the IPI materials never go home, so the parents will never see them if you don't get them into the classroom. Once they do arrive, give them a chance to try out the new materials. This will help to explain why there will be little homework. You may want to assure them that you will let them know if they can be of help to their children. Perhaps some drill work will be required of those children who have not mastered their tables and the parents cam help with this kind of activity.

THE FLOATING TEACHER. If this program is properly staffed, a floating teacher should be available to help you when a backlog develops. Little planning is needed since the floating teacher simply comes in at your request and prescribes for the children to which you assign her. However, if you want the floating teacher to work with a small or large group, more advance preparation will be necessary.

IT'S COMFORTING TO KNOW. Teaching in the IPI system is no picnic, especially in the initial year. You will spend extra hours meeting the demands of your students. But take heart; once you have taught this way you will not want to return to the old way.

CHAPTER VII

Materials for IPI

IPI presents its instruction in a variety of modes - the teacher has the option of selecting the appropriate approach for each child. The available modes include specific instructional materials from RBS - published by Appleton, Century and Crofts. The following descriptions and examples present the materials offered by RBS.

Diagnostic Instruments

Diagnosis of pupil achievement plays a vital role in the IPI system. In order to guide the learning experiences of individual pupils, it is essential for the teacher to have information about pupil performance related to the specific objectives in the continuum. This information provides the basis for helping the teacher decide where each pupil should begin work and when that pupil is ready to proceed to the next task. Four types of tests have been developed for this purpose.

Placement Tests In Mathematics

A battery of six tests has been developed for the purpose of determining individual placement within each content area. Each instrument is designed to test pupil performance in each of the content areas in the level. So, for example, the Level B test includes sections on Numeration, Place Value, Addition-Subtraction, Fractions, Money, Time, Systems of Measurement, and Geometry. The six tests are for Levels B through G inclusively.

Not every objective in a unit (e.g. B Numeration) is tested on the placement test for that level. In order to keep the length of the test to a minimum while providing for maximum of information, only the most important, or most characteristic objectives in each unit are tested. No oral exercises are included in the placement tests.

The placement tests are to be administered at the beginning of the school year. Based on past performance of pupils on these tests the following pattern of administration is suggested.

Grade	Tests	Grade	Tests
1	B	4	D and E
2	B and C	5	E and F
3	C and D	6	F and G

Since the purpose of this placement testing is to provide a general indication of pupil performance as efficiently as possible, flexibility must be introduced into the system by the teacher. If, for example, a child in grade 4 has difficulty with the level D test, he probably should not be given the level E test. The information provided in the level D test would be sufficient to indicate the level in which the student should start working. On the other hand, if a pupil in grade 2 should have mastery of several units in level C he might be given the level D tests for those units. The prime goal is to get the pupil started in the appropriate learning exercises as quickly as possible with as much accuracy as possible.

A child is considered to have placed in a unit at a given level if he scores between 20% and 80% on the placement test. A score above 80% indicates that the child should be tested at a higher level, while a score below 20% indicates that the child should be tested at a lower level.

The IPI Pretest

The purpose of this test is to determine which skills within the level require further work. For example, a pupil is administered the D Multiplication pretest. His percentage scores on each of the skills are as follows:

Skill 1	100%	Skill 5	100%
Skill 2	60%	Skill 6	20%
Skill 3	100%	Skill 7	100%
Skill 4	100%	Skill 8	100%

Since he must score 85% or better on all skills, the pupil does not pretest out of the unit, but rather, should first be given a prescription for Skill 2. After he has achieved mastery of this skill, as indicated by the curriculum embedded test, he should then be given a prescription for Skill 6. After mastery of this skill the pupil would be given the posttest.

Curriculum-Embedded Tests

The function of the curriculum embedded test (CET) is to assess mastery of one particular skill within a unit. A CET will be administered at specified intervals in the sequence of work sheets prescribed for the attainment of the skill. The CET in Math has two parts. The second part (below the double line) serves as a short pretest of the next objective in that unit of the curriculum. If the skill being tested is the last skill in the unit there will be no test below the double line.

If the pupil masters the CET (upper part) with an 85% criterion level he will proceed to the next skill in the unit which he has not yet mastered. If this is the last or only skill in which the pupil lacks mastery in that unit he should be given the posttest for that unit. If the pupil does not achieve mastery on the CET, he will be given further work pages of other exercises in that skill and will be required to take another CET (an alternate form of the CET when available).

The second part of the CET (below the dotted line) is important when the pupil needs work on the next skill in the unit, e.g. when a pupil is owrking in C Numeration 2 and did not have mastery of C Numeration 3 on the pretest. If the pupil indicates mastery (once again 85%) on the second part of the CET he should be prescribed the CET for the next skill rather than actual work on the skill. If he masters the CET (first part) of this skill he will have tested out of that skill and proceed to his next required skill or to the unit posttest.

Materials

If Individually Prescribed Instruction is to be effective, it requires lesson materials that teach each of the many objectives that make up each curriculum sequence. Furthermore, it requires that such materials be of a type which, for the most part, the pupil can study quite independently. This section discusses some of the characteristics of such materials and some of the procedures involved in their development.

The key to materials for IPI mathematics is the set of performance objectives that have been developed. It is obvious that materials must be matched to the objectives. It was found that very few materials are commercially available which met the performance objectives and also were acceptable to the IPI procedures. Therefore, a great majority of the materials had to be created.

A rigorous system was developed to match materials and objectives. Several years of work at the LRDC at the University of Pittsburgh finally resulted in a set of materials which is satisfactory. Even with this background of testing,materials are still tested and revised as needed.

The materials consist of multimedia items which appeal to all senses. The great majority will be linear in nature, but for those students requiring it, other stimuli will be used.

The pages of materials are prepared as single pages. This allows for flexibility in assigning or prescribing materials. It is of the utmost importance that the materials be so organized that they can be prescribed in any sequence the diagnosis indicates the need. As will be apparent the basic format of the work sheets is self-instructing.

In addition to the work sheets, there are tapes and manipulative materials which are prescribed for those students needing them.

There is no attempt made to supervise the materials storage centers with adult personnel, but rather, children are to be responsible for getting their own materials.

In the primary grades students may have help in the selection of prescribed materials and will have all work sheets and tests marked for them. As they progress in independence they begin to mark their own work sheets until by grade 5 or 6 most work sheets are self corrected.

The materials are a vital part of the IPI program. They must provide a flexible program for all pupils.

All schools active in the IPI program are able to order these materials directly from the publisher. Only schools participating are eligible to order materials.

It is important to indicate that the IPI mathematics program is not limited to the materials provided by RBS. Any supplemental (basic or what-ever) material that is appropriate to use in the teaching of an objective should be used. The decision on what to use is the teachers'.

CHAPTER VIII

Orientation, Education and Information

Whenever a new program is implemented into a building or a district there is much orienting to be done. The orientation of staff has been discussed. The orientation of pupils and parents is equally important. Each group has certain needs and fears. It is essential to pre-plan for orientation of students and taxpayers.

The pupils in an IPI program very quickly adjust to the format. The explanation of the forms and procedures to be followed takes very little time. The Placement testing requires several days. During this period the needed familiarity with terminology and material storage is handled for most children. PL First grade children require several weeks before they are able to locate material independently in the materials storage room (material center). Most other children can locate this material after a week or two.

Parents show tremendous interest in the program. They ask many probing questions about theory and practice. Horseheads found it very helpful to present programs explaining the different aspects of the IPI porgram. Examples of topics include: Individualization, Pretesting, Prescriptions, Independence, amd Reporting.

Reporting to the parents has been of vital concern to the Horseheads parents. It is impossible to report an A, B, etc. or an 85 or 92 in IPI Mathematics. Therefore, it was necessary to use a progress chart type report. The report essentially begins by showing the pupil's original placement in each mathematics topic and then shows the pupil's growth in each topic periodically. This procedure is working very well. Some thought may need to be given to sending data with a child who leaves the district.

Enlisting community support for education is crucial for all programs. -- IPI is no different. It is easily sold to the public because it has so many ways to work for the individual child's betterment and because it follows such a logical format. The difficulty with the community comes from lack of information and from the present increased cost of IPI. The costs are very rapidly decreasing so that this problem will diminish. Information that fosters understanding must be made available to parents, taxpayers and faculties of other buildings. The greatest problem in Horseheads regarding acceptance came from other staff members. Some didn't understand; some were upset because they didn't have it. Adequate explanations can resolve most of these problems.

CHAPTER IX

What You Can Expect From IPI

First, you must expect more work. No new program will function without a great deal of extra effort. The building principal must bear most of this at the beginning. He not only must operate a building with its regular problems but must handle the problems that occur with any new program.

Second, you must expect a tremendous change in teacher attitude. They begin to approach children as all being different. Teachers have believed this for years, but after some experience in IPI they really begin to act and behave as if they believe it.

Third, you will find a great improvement in the children's attitude toward mathematics. The IPI data proves that children's attitudes toward school and mathematics change after working with IPI mathematics. There is some loss of positive attitudes in non-IPI programs -- reportedly because they are too rigid, too boring, too too --- well, not individualized.

Fourth, you should not expect much - if any - difference in achievement from most achievement tests the first year. In subsequent years the IPI pupils may show slight gains in achievement. Their primary gain is in attitude.

Fifth, you must prepare to expand and/or extend the program of individualization. Few schools find that one building in IPI is anything but an appetizer.

Sixth, you should expect a rewarding, exciting year - never will you return to the traditional - for no longer will you allow yourself to do so.

CHAPTER X

Suggested Time Schedule

September -	Application to RBS for following September.
January -	Team-principal, some teachers and a central office person visit a model school.
February -	Begin informational sessions with district staff.
March -	Select staff for September.
April -	Informational sessions for parents and taxpayers begin.
May -	Principal attends training sessions. Budget prepared. Facility changes planned.
June -	Training program for staff.
August -	Training program completed.
September -	Program Implementation.

APPENDIX H

IPI Math Progress Report

______________________ **Grade** ______________ **Room** __________

IPI MATH PROGRESS REPORT

RED - denotes initial Placement

BLUE - denotes current level of performance

MATHEMATICS AREA	A	B	C	D	E	F	G	H
NUMERATION (01)								
PLACE VALUE (02)	▨							
ADDITION (03)	▨	▨						
SUBTRACTION (04)	▨	▨						
ADDITION/ SUBTRACTION (34)			▨	▨	▨	▨	▨	
MULTIPLICATION (05)	▨	▨	▨					
DIVISION (06)	▨	▨	▨					
MULTIPLICATION/ DIVISION (56)	▨	▨	▨	▨	▨	▨	▨	
COMBINATION OF PROCESSES (07)	▨	▨						
FRACTIONS (08)								
MONEY (09)	▨						▨	▨
TIME (10)	▨							
SYSTEMS OF MEASUREMENT (11)	▨							▨
GEOMETRY (12)	▨							
SPECIAL TOPICS (13)	▨	▨						

APPENDIX I

Dissemination Materials

HORSEHEADS CENTRAL SCHOOL DISTRICT

HORSEHEADS, NEW YORK

NEWSLETTER

JANUARY, 1969

IPI - One Individualized Approach to Learning Mathematics

In September, 350 students at the Broad Street Elementary School, in the Horseheads Central School, Horseheads, N. Y., began a new approach to learning mathematics. For the first time, each of these children will be able to proceed, not as a class, but as individuals through a sequenced program of mathematics skills tailored to his own needs.

This program, expanded on an operational basis to 100 schools in the nation this year, is called INDIVIDUALLY PRESCRIBED INSTRUCTION. It is based on the premise that no two students are ready to learn the same thing, at the same time or at the same rate. Thus it attempts to provide each child with the opportunity to proceed according to his own ability, interest and best way of learning. It further allows a student to exempt that which he already knows and to master those skills in which he shows a weakness.

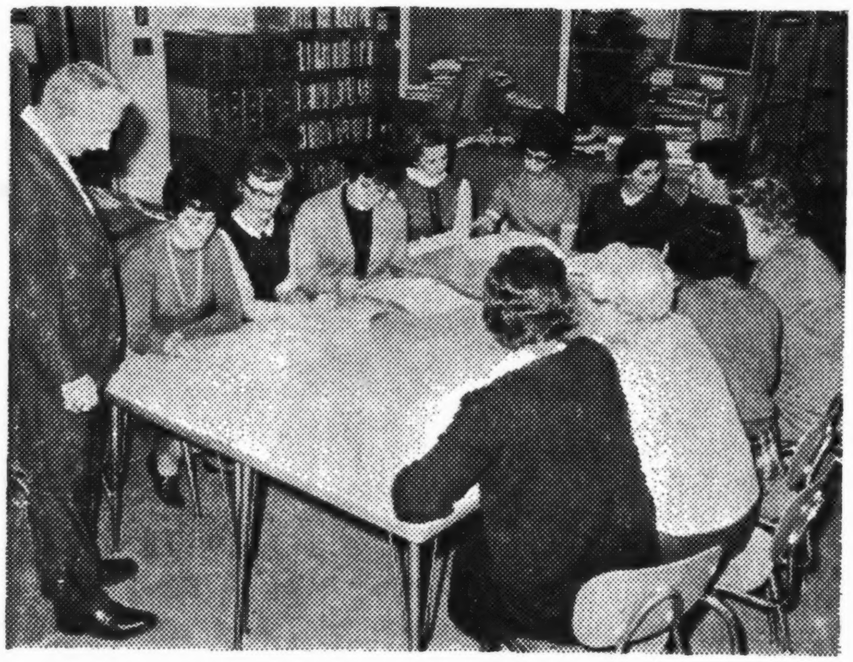
For years, those of us in education have sought ways to give attention to individual differences within the content of the formal class setting. In the traditional classroom, where students were assigned largely by age and taught as a group, formation of smaller groups in reading and mathematics has been the typical attempt to individualize teaching.

This approach has tended to limit the gifted student, who is capable of moving much faster with less drill, and the less gifted who needs more individual attention.

Many changes in structure have been advanced as a means of placing children in more appropriate learning groups, among which are team teaching, non-graded groupings, closed circuit television and independent study contracts. However, in most cases, the basic curriculum has not been changed to offer an individual course of study for each child.

IPI offers a complete instructional system which includes sequenced learning materials, testing instruments and constant teacher evaluation of students which allows each member of a class to proceed toward specified learning objectives at different rates and ways of learning best suited to him.

It is entirely possible, in this system for all 350 students in this program to be following 350 different courses of study.



William Meade, Broad Street Principal, conducted a 70-hour workshop with the 12 participating teachers after attending a 3-week IPI spring workshop himself. Here the teachers are practicing writing prescriptions to meet individual learning needs.

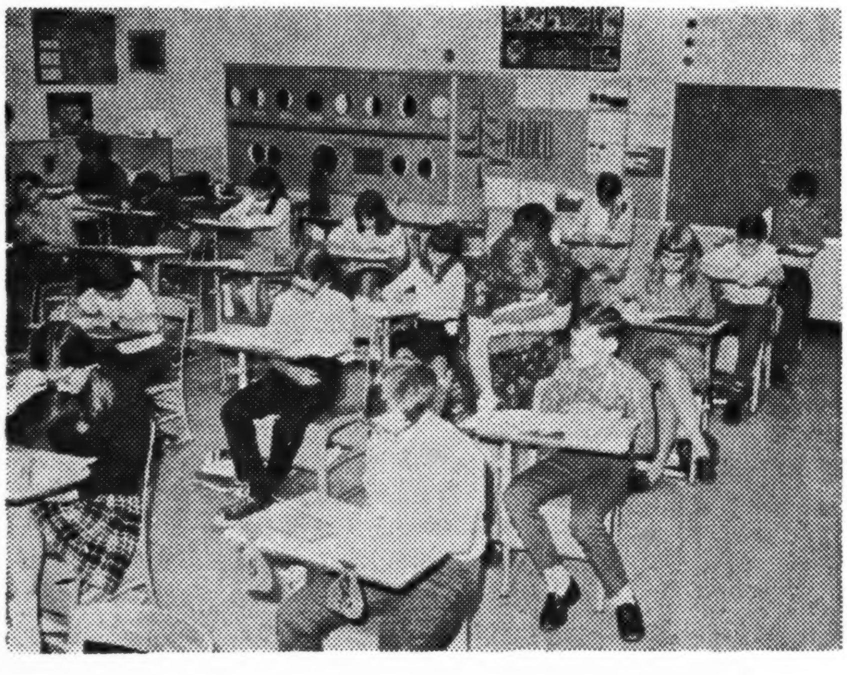
WHERE IPI ORIGINATED

IPI was created by the Learning Research and Development Center at the University of Pittsburgh. It was developed by Drs. Glaser, Bolvin and Lindvall, a team of psychologists and curriculum specialists at the Center. The experimental project was initiated in the 1963-64 school year in the Oakleaf Elementary School in the Baldwin-Whitehall Public Schools of suburban Pittsburgh after a series of exploratory studies began in 1961-62.

Since 1964, the program has been expanded to 25 schools in the nation who are field testing its materials and concepts. In 1968, 75 more schools were selected for operational programs in mathematics. Such a vast undertaking requires well based techniques for control and evaluation.

Research for Better Schools, Inc., a Regional Research Laboratory funded under ESEA IV, has the task of determining "How does this innovation work in the pilot schools?" The five major kinds of data collected to answer this question are: (1) the materials, (2) the pupils, (3) the teaching staff, (4) the community setting, and (5) the Individually Prescribed Instruction concept as an educational system.

Data is collected frequently from the participating schools, fed into computors, compared to data in non-participating control schools and returned to the Pittsburgh Research and Development Center. Here recommended changes are made to continually improve the system.



THE SPECIFICS OF IPI

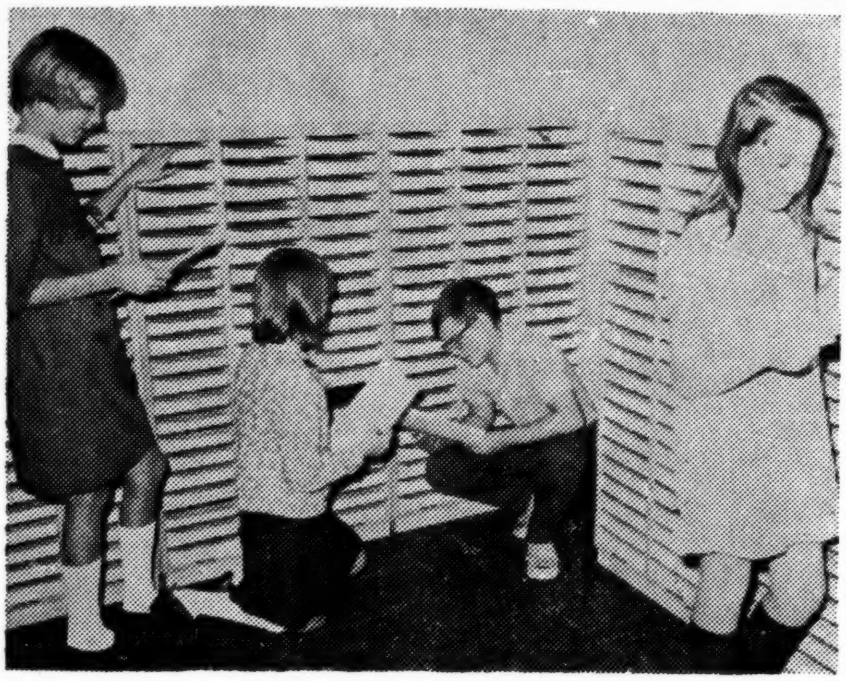
To date, courses of study are being developed in mathematics, reading, social studies, English and science. Mathematics, however, is the only course which has been released for limited operational use.

IPI basically consists of the teacher planning and conducting with each student a program of studies which is tailored to his own learning needs and his characteristics as a learner. In continuing to search for ways to adapt instruction to the individual, such factors have been taken into account as rate of learning, amount of practice, and, to some extent, preference for mode of instruction.

The rate of speed at which a child progresses depends on his own capacities. The child places himself on the continuum by taking both placement tests and pre-tests. The continuum consists of curriculum material arranged in a sequential order. Assignments are given as a prescription (an individual daily lesson plan) to fit his needs. Student mastery of the curriculum is judged by curriculum-embedded tests and pre-tests. A level of 85% or better performance is required on these tests before moving forward on the continuum.

In most cases, the child works independently, thus building a sense of responsibility and confidence. Successful experiences are built into the course of study. Soon, the child begins to realize that learning is a process which depends on his own participation and initiative.

Students work independently most of the time. The teacher prescribes lessons for individuals and gives help where needed. The Aide corrects work, records marks and gives summary reports to the teacher.



Students go independently to the IPI Materials Center to pick up their daily work sheets. They have accepted this responsibility amazingly well.

IPI LEARNING GOALS

IPI begins with a set of learning goals based on the following fundamentals:

1. Instruction must be based on carefully sequenced and detailed behavioral objectives having such characteristics as
    a. telling exactly what must be done for mastery;
    b. being grouped in meaningful streams of content;
    c. being sequenced within streams so that each one builds on those preceding;
    d. being grouped into meaningful subsequences or units.
2. Lesson materials must be geared exactly to the objectives and must allow for students to proceed independently.
3. A rather detailed provision for diagnosis of pupil skills and abilities and continuous monitoring of pupil progress must be basic to the program.
4. Each pupil's work must be guided by written prescription prepared for his individual needs and interests.
5. The teacher's role must shift from that of imparting information to that of managing individual activities.
6. The activities and procedures must be pupil-oriented since success in any curriculum depends on the quality of the experiences pupils have.

As an example, IPI mathematics is divided into 13 mathematical concepts such as numeration, addition, time, money and geometry. Within these concepts or skills, there are 418 specific and sequenced objectives grouped in 9 levels applicable to grades 1 - 8. Both the 13 skills areas and the behavioral objectives within each are sequenced at each level. Thus the student progresses through them in a logical orderly manner, leaving no gaps in his learning.

IPI BASED ON TESTS

A complete set of tests are provided to properly place students and evaluate their progress through the year. These tests are essential to proper use of the IPI system.

Placement Tests are given at the beginning of each school year to determine what level the student should begin in each of the 13 skill areas. The tests not only show where work is needed but in which areas work is not necessary, but are still only a screening test.

Pre-Tests follow the placement tests to provide a detailed diagnosis of strengths and weaknesses within the unit identified for further work.

Curriculum-embedded tests show a student's progress within a unit and are built into the daily or weekly worksheets. They show whether the student really understands the skills involved.

Post Tests are given to show mastery of units. These tests are similar to the pre-tests.

Armed with the information gained from this testing, the teacher is able to write prescriptions which exactly match the student's needs. The increased amount of time devoted to testing is regained by more efficiently using remaining instructional time.

IPI AT BROAD STREET

As one of 100 schools in the nation and New York State using IPI at the operational level, Broad Street Elementary School must still be considered a demonstration school. As such, visitors are welcome to see for themselves how remarkably well this program works.

Only 350 students, or about half of each grade 1 - 6, are taking part in IPI Mathematics because Horseheads Central School and the Center on Innovations, NYS State Education Department, are interested in checking for ourselves the claims made for this program. The other half of the school, and a sampling of students from another elementary school in the district, are serving as control groups. Participating classes and teachers were selected at random, but represent all levels of homogeneously grouped students.

Forty minutes daily are devoted to this program. Teachers are assisted by four teacher aides who correct the much increased number of tests, keep records of them and provide teachers with weekly reports. Although the building contains conventional classrooms, cooperative planning is an integral part of the program and some students go to other rooms.

As you observe, you will see teachers and aides meeting with individual pupils daily, students moving independently about the building to pick up their worksheets, and students working independently or in small groups using a variety of materials and approaches. You will note that the students are accepting responsibility for their own actions, utilizing their time fully and enjoying every minute of it.

The program at Broad Street is under the auspices of the New York State Education Department's Center on Innovation and is receiving financial assistance from that Center.

TO SEE IPI AT BROAD STREET

We at Horseheads are most anxious to share with you our experiences with a program which has great promise of becoming a widely accepted system for individualized learning. We urge you to come and see it for yourselves. All you need to do is call William Meade, Principal and Project Director at 607-739-5601 or write to:

WILLIAM MEADE, *Principal*
Broad Street Elementary School
Horseheads Central School
Horseheads, N. Y. 14845

HORSEHEADS CENTRAL SCHOOL DISTRICT
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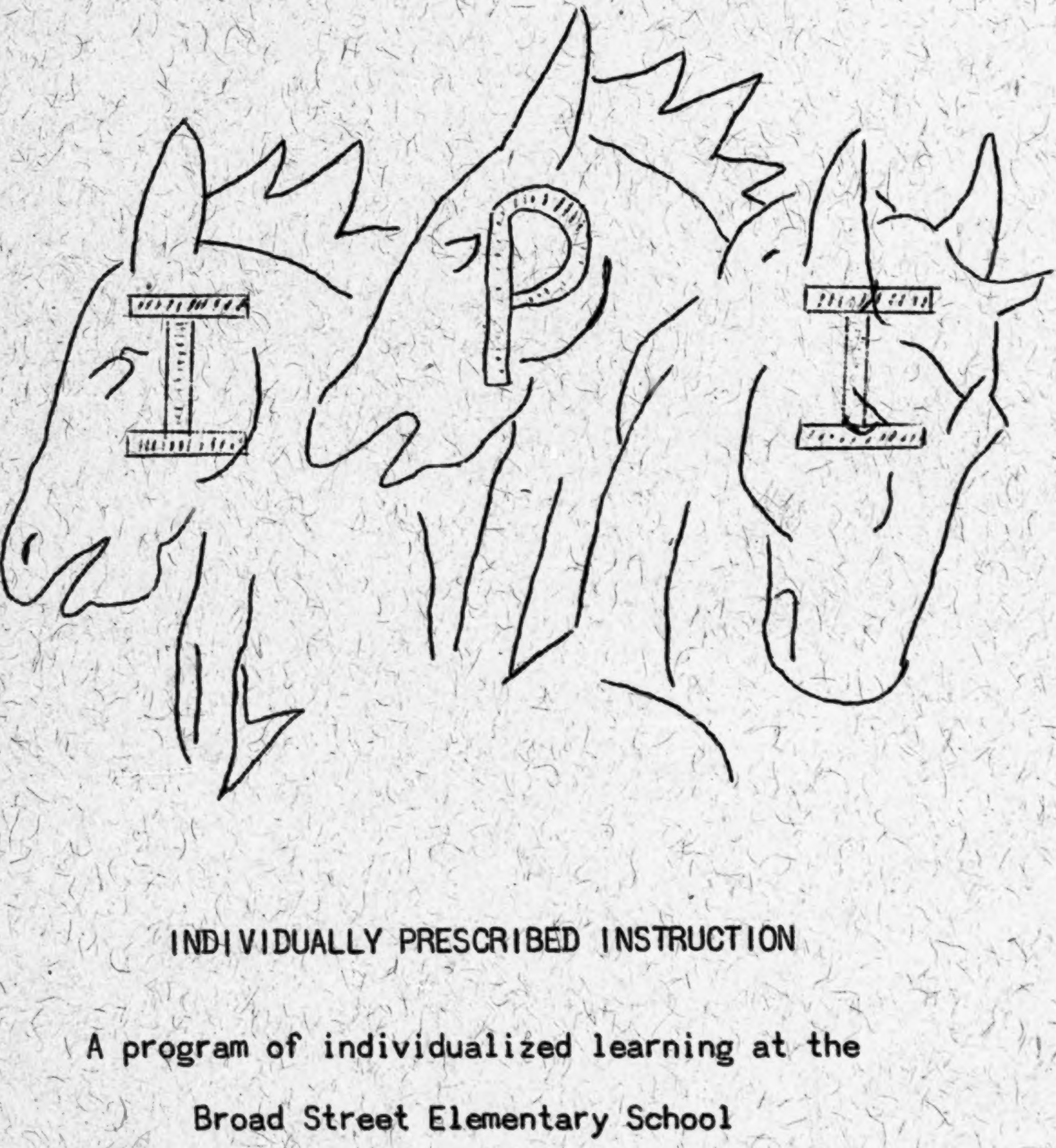

INDIVIDUALLY PRESCRIBED INSTRUCTION

A program of individualized learning at the
Broad Street Elementary School

INFORMATION BOOKLET

Individually Prescribed Instruction

A comparative study of student achievement and of other selected characteristics in a program of individualized instruction in mathematics and in a program of traditional instruction in mathematics in grades 1-6.

Conducted at the

Broad Street Elementary School
Horseheads Central School District #1
Horseheads, N.Y.
1968 - 69

William F. Meade, Sr., Project Director and Principal
Lawrence M. Griffin, Assistant Director and Curriculum Coordinator K-12
Norman Becker, Consultant for Evaluation, Cornell University
Francis P. Smith, Consultant for Dissemination Materials, Fed.Proj.Coordinator

Dr. Harry Q. Packer
Superintendent of Schools

This project and dissemination material is authorized under a grant by the Center on Innovation, New York State Education Department.

FOREWORD

The Little Red School House, Mark Hopkins and electronic data processing may seem like an incongruously nostalgic grouping. Yet, as you observe Individually Prescribed Instruction, you cannot help recognizing an element of all these. Although we have believed in personalizing education for decades, a feasible plan for accomplishing this has eluded us. However, we must not abandon the search for a better way to meet the individual needs of students. Through data processing we now have much more evaluative information available with which to make judgments more quickly about promising innovations which might help us to meet those needs.

As Horseheads Central School embarked on the task of moving closer to individualizing its instructional program, the search for techniques revealed one plan which seemed to hold great promise. A visit to the McAnnulty Elementary School near Pittsburgh by staff and Board of Education representatives reinforced our belief that IPI was a well-researched, complete system which we wanted to try.

Thus, we were very pleased to be accepted for participation in IPI Mathematics for the fall of 1968. The more experience we have with the program, the more convinced we are that it is one excellent way to individualize instruction. As you observe the program and talk with teachers, we believe you will be as impressed as we are with its effect on the children.

I am personally pleased that you have taken the time to visit Broad Street Elementary School and hope you have enjoyed your visit. As you leisurely read through the booklet, the detailed information contained therein will provide you with the background information to supplement what you have gained through observation. But if you have unanswered questions. I am sure the IPI staff will be happy to help.

I would like to express my appreciation here to Lawrence Griffin, William Meade and Francis Smith, who have put together the dissemination materials for this project.

The Horseheads Central School District is also indebted to the Center on Innovation in the New York State Education Department for its grant which made this project possible.

HARRY Q. PACKER
Superintendent of Schools

BACKGROUND

Individually Prescribed Instruction, a procedure designed to permit the school to more nearly meet the needs of the individual pupil, is a part of a rather long term tradition in the historical development of education. Horseheads Central School along with most educators and psychologists has long recognized the importance of adapting instruction to the individual, but numerous efforts to achieve this have seldom been very successful. Results in the early trials of Individually Prescribed Instruction (IPI), as reported by Research for Better Schools (RBS), seem to indicate it is a gigantic step in the direction of individualized instruction.

A survey of the history of instruction indicates that formal learning began very much as an individual affair; that is, pupils came to school to receive instruction individually from the teacher. Education was generally for a select few; therefore, fewer pupils attended school. This made possible the provision of individualized instruction for those students.

For example, in the one-room school, pupils proceeded on an individual basis rather than as intact groups. As education involved a larger faction of the population, it became necessary to deal with pupils in grade level groups, and individualized instruction diminished. However, as knowledge of the significance of awareness of differences among pupils has increased, many efforts have been made to individualize instruction, even within the context of schools offering mass education.

Systematic plans for providing instruction on an individual basis date back as far as 1888 with the work of Preston Search.[1] Washburn[2] and Billet[3] point out that the efforts of Frederick Burk in developing materials for individual instruction are among the best known.

Shane reviewed individual differences in the historical perspective of school organization plans. He notes that:

> "In general, during the past century, educators have endeavored: (a) to reduce individual differences found in non-graded schools of the seventeenth and eighteenth century by introducing grade levels, (b) to make the graded approach less arbitrary by permitting pupils to progress at different rates of speed on "multiple-tracks" or individualized programs, (c) to organize students within a grade level through ability grouping, and (d) to introduce ungraded grouping, especially during the early elementary years, as in Milwaukee during the early 1940's."

A historical overview of organizational plans since 1850 indicates that there has been considerable debate and little agreement on the best framework for teaching and learning. Old ideas have continually reappeared on the educational scene. A genuinely novel approach has occasionally made its appearance, but no one best kind of classroom organization has ever found universal acceptance. Shane[5] further notes that the historically significant plans dealing with individual differences within the organization of the school have been related to grouping for instruction.

Experimentation with individualized instruction has demonstrated that it can produce desirable results. Several researchers have noted that individualization of school programs show evidence of the following: time is saved; retardation of students is reduced; a motivating factor is present. Henderson[6] and others conclude, "Paced instruction designed to insure success as a reward for individual effort is a prominent characteristic of most corrective programs." They further state, "It is possible that a major effect of this technique is a gradual development of a new self-reliance, which releases the child from a dependence upon others and permits him to deal more effectively with the printed page." Mayer-Oakes[7] reports a gain of 25 percent in proportion of students passing the state-wide examination after experience with the Dalton Plan. Peters'[8] findings, based on thirteen experiments, note favorable results for individualising instruction when comparing the contract plan and the recitation method.

Berson,[9] Jones and Jones,[10] Webster and others,[11] and Goodlad and Anderson[12] have provided research to substantiate great differences among individual pupils. These researchers clearly state that great differences in physical development, motor, intellectual, emotional, and social behavior do exist. Research efforts of Washburne and Marland,[13] Jones,[14] and Peters[15] note attempts to provide for individual differences. Jones[16] also points out that when provisions are made for some of the differences, classroom instruction can be made more effective.

This limited review of individual differences and attempts at individualized instruction is by no means complete. The previous brief overview only highlights some of the research and programs concerned with individual differences. The central question of concern to most teachers is how to meet the needs of the individual pupil within the context of school systems geared to educate the masses. This problem, as important as it is, has only recently been given the serious, large scale study that is required.

Recent research has tended to indicate that it is now possible to implement a program that actually provides for individual differences. In our searching through the various current approaches to this end, one seems to stand above all others.

The Learning Research and Development Center at the University of Pittsburgh has created a unique and successful program which we propose to adapt into our particular situation. Through many contacts with Research for Better Schools, who is handling the field trials for this program, we have become committed to and accepted into Individually Prescribed Instruction.

IPI

Since its beginning, as a fragmented idea in 1963, Individually Prescribed Instruction has undergone rigorous study. It has now reached the point where large scale trials of the program are needed. Therefore, a gigantic step in the direction of individualized instruction is being taken in a true test situation by Horseheads Central School in cooperation with Research for Better Schools.

RBS is gathering data weekly from the pilot schools concerning materials, pupils, teaching staff, community setting, and the IPI concept. This data is being compiled and analyzed via computer in an attempt to answer the question "How does this innovation work in the pilot schools?"

Other questions that RBS is attempting to answer are:

Under IPI do

1. pupils learn more?
2. pupils learn faster?
3. pupils learn quicker?
4. pupils retain their learning longer?
5. pupils have undesirable side effects?
6. teachers need retraining?
7. the costs make it prohibitive?

AN OVERVIEW

The concept of Individually Prescribed Instruction is being applied to the development of programs in reading, social studies, science, english and mathematics. In each case, behavioral objectives have been developed to indicate the broad spectrum of sequential skills which make up the continuum of learning which students must master. Activities and materials are being developed to assist students in mastering these skills.

To establish where a student begins on the continuum, a series of placement tests corresponding to the various levels along the continuum have been devised. Once the student is placed, the teacher prescribes activities for those skills upon which the student has scored lowest. These assignments are made in sequential order as well. Pretests within skills give further clues as to appropriate activities. As the student completes his daily prescriptions, his work is checked before new prescriptions are given. When it appears that mastery has been achieved, a Curriculum Imbedded Test is given to measure mastery of that particular skill or objective and also a limited pre-test of the next objective. If the test shows mastery, the student then moves to the next objective sequenced for him, and the cycle is followed again. As all objectives are mastered at any given level, the student moves to the next highest level and follows the same procedures.

Students spend much of their time in independent work. However, the teacher may prescribe a wide variety of activities, such as: tutoring, peer tutoring, small group instruction, and large group instruction. When working independently, the student may complete the sequenced materials, take tests, see a filmstrip or film, listen to a record, or go to the learning center. It should be noted that while students are working independently, they enjoy quite a bit of freedom both in the classroom and in going to the center where sequenced materials are stored.

THE ORIGINATORS OF IPI

"The USOE-sponsored Learning Research and Development Center (LRDC) at the University of Pittsburgh, which specializes in the research and basic design of new educational technology, is the creator of IPI. The idea was developed into a functioning operation by Robert Glaser, LRDC Director; C. Mauritz Lindvall, associate director of LRDC; and John O. Bolvin, IPI director at LRDC. They worked in close cooperation with the University of Pittsburgh and Superintendent W.R. Paynter and his staff at the Baldwin-Whitehall School District."

"The idea of IPI began on a small scale. During the school year 1963-64, LRDC and the Baldwin-Whitehall district initiated an experimental project to investigate the feasibility of a system of individualized instruction in an entire K-6 school. This was the direct result of a series of prior exploratory studies, begun in 1961-62, designed to test preliminary notions on a smaller scale in a signle classroom. The work started with the use of programmed instruction in an intact classroom unit in which the teaching practices were oriented around the conventional grade-by-grade progression of learning. As work progressed, it soon became apparent that the significant individualization feature of programmed instruction could not be achieved unless the intact classroom changed its organization to permit a more flexible progression. As a result, a second set of studies was instituted, using programmed instruction and other materials in a more flexible context." 19

This well researched and field tested program also contains a thorough evaluation program carried out by Research for Better Schools, Inc. of Philadelphia, Pa. To determine how well this innovation works in pilot schools, data is being collected about: the materials; the pupils; the teaching staff; the community setting; and, the IPI concepts as an educational system.

IPI AT BROAD STREET

Research for Better Schools has included Horseheads Central School's Broad Street Elementary School in the one hundred field trial schools in the nation for the 1968-69 school year. Twenty-five schools already have been conducting the experimental phase. Only the mathematics program has been released for field trial.

In addition to carrying out the field trial, Horseheads Central School is attempting to verify the validity of the IPI Mathematics Program as an instructional approach in grades 1 - 6. Thus, our goals are nearly the same as those adopted by R.B.S.

OBJECTIVES

In this project, we will test the hypotheses in the following groups.

Student Achievement

1. Since every pupil in IPI can move at his own pace, the mathematics achievement of the experimental groups will be greater than the mathematics achievement of the conventional instructional control groups.

Student Attitudes

1. The independent student will do as well in either method, but students low on dependence may do better in mathematics in the conventional control groups.

2. Students with a more positive attitude toward mathematics will do better in IPI than in conventional instruction.

3. IPI students will develop a better attitude toward mathematics than those students in conventional classes.

4. IPI instruction will increase a student's independence.

Teachers

1. Classes with teachers having positive attitudes toward IPI will achieve better than classes with teachers with negative attitudes toward IPI.

2. The change in the teacher's role required by IPI can be accomplished through a minimum amount of in-service training.

IPI IMPLEMENTATION MANUAL

1. The project's principal investigators will complete a document which will present schools who may wish to implement an IPI program the necessary data, such as.

    a. R.B.S. requirements
    b. Financial requirements
    c. In-service training requirements
    d. Administrative requirements and problems

PROCEDURES

Broad Street Elementary has 26 sections in grades 1-6. Thirteen sections totaling 350 students were selected at random, half from each grade level. Since each grade is grouped homogeneously by achievement, representation of high, average and low achieving groups was included. Groups had already been established and teachers assigned prior to acceptance of the project. Those teachers had the option of not participating, but all desired to be included except one who withdrew because of an impending health problem. Actually, twelve teachers are participating because the sixth grade is departmentalized.

Four teacher aides have been included in the project to perform the much increased test correcting and recording required in this program. A description of their duties may be found later in this booklet.

Control groups include those students at Broad Street not participating in IPI and students from another elementary school in the district who have been matched to IPI participants.

Students participate in 40 minute daily mathematics periods. Sections are scheduled throughout the day so as to efficiently utilize the aides.

DESCRIPTION

The description of the program which follows has been divided into four parts: Behavioral Objectives, Diagnostic Instruments, Materials, and Staff.

Behavioral Objectives

The development of an educational program that provides for individual differences among students requires a clear knowledge of educational objectives. There is little doubt that specifying educational objectives in terms of student behavior is a useful approach for individualizing instructional programs. It simply means changing the behavior of a student so he is able to display a talent he didn't previously show. Teachers, then, must also know what the specific behaviors are and determine when and where they apply.

Behavioral Objectives are developed at three levels.[17] The philosophy of the Horseheads Central School District and the aims of American education in general indicate that students study mathematics. This is level one. Determining the particular course of study and the defining of each unit within the mathematics continuum can be considered the second level. Stating the specific objectives of each unit of work in mathematics, then, is the most specific and the third level of instructional development.

The Learning Research and Development Center of the University of Pittsburgh provided the leadership in meeting with classroom teachers to determine the areas of work that children study in learning mathematics. Thirteen specific areas were developed which compromise the mathematics continuum of the Horseheads Central Schools' mathematics curriculum. The thirteen areas are as follows:

1. Numeration - includes counting, use of ordinals, estimating and rounding numbers, prime numbers and other bases.

2. Place Value - includes charting numbers to 100,000, values to one million, exponents to base 10 and exponents to 10 cube.

3. Addition - includes adding numbers, expanded notation, carrying, adding negative numbers, decimals, powers to 10, and place value in other bases.

4. Subtraction - includes expanded notation, borrowing, negative and positive numbers, and powers to 10.

5. Multiplication - includes repeated addition, associative and distributive principle, algorithm and three digits, decimals and positive and negative numbers.

6. Division - includes partition, inverse to addition, ladder algorithm, remainder and fractions, positive and negative numbers and square root.

7. Combination of Processes - includes word problems, selection and discrimination of process, solving for N, and computing averages.

8. Money - includes the recognition of money, equivalents, practical use of and use of addition, subtraction, multiplication and division.

9. Time - includes the study of days, hours, minutes, seconds, decades, centuries, score, fort-night, converting to units, and times ones.

10. System of Measurement - includes qualitative dimensional discrimination, equivalent length - converting units, linear and volume systems, centimeters, and using process of adding, subtracting, etc.

11. Geometry - includes recognition, drawing simple geometric figures, open and closed curve, knowing area, perimeter, calculating circumference, and calculating volume.

12. Fractions - includes the identification 1/4, 1/2, 3/4, equivalent fractions, using the processes of additon, subtraction, etc.

13. Special Topics - begins at level D and includes the study of Roman Numerals, map reading, ratio, percent diagrams, etc.

The above listing points out that the broad area of mathematics can be divided into more concise units which are necessary for the study of this subject.

An example of behaviorally written objectives of the mathematics continuum from Individually Prescribed Instruction is cited below. This particular listing of specific objectives is for the levels of instruction in the area of addition.

Leval A

1. Given two equivalent or non-equivalent sets of objects, up to ten, matches the elements in a one-to-one relationship.

2. Draws or arranges sets of objects to illustrate addition and subtraction facts through six; e.g., adds some objects to make two sets equal, adds some objects to make a set match a given number, circles the correct numeral for pictured addition statements.

Level B

1. Writes the number of objects in each of 2 sets and the number of objects when put together. Sums to 12.

2. Circles or fills in the correct numerals for pictures addition statements Circles or fills in the correct numerals for pictured subtraction statements.

3. Selects or states the word when given the symbol and the symbol when given the word for +, -, =.

4. Fills in mumbers (missing sums and/or addends) to make "true number sentences" for pictured addition and subtraction situations. Number sentences contain "+", "-", and "=". Sums to 12.

5. Finds the sums and differences for addition and subtraction statements with "+" and "-" signs. Problems written in both horizontal and vertical form. No pictured groups as aids. Timed mastery test. Sums to 12. (Missing addends not tested.)

6. Selects "other names for numbers" by matching addition or subtraction expressions (N+M) or (N - M) with pictured groups or numerals to 12.

7. Writes = or + sign to identify true or not true addition or subtraction statements. Creates true number sentences by correcting incorrect sentences. Changing only one digit. Sums to 12.

8. Writes or completes two addition equations which then illustrate the commutative principle for addition. Sums to 12.

9. Completes addition and subtraction sentences with missing sums (differences) or addends associated with certain number families. Sums to 12.

10. Solves or completes one-step word problems with pictures which require the use of addition and subtraction facts through sums to 12.

11. Says the words: and, is, less, plus, minus, equals, when confronted with symbols: +, -, and =. Circles the numerals which indicate the sum or addends in a number sentence.

Level C

1. Adds three single digit numbers in different ways to illustrate the associative principle for addition. Puts in parentheses to show which numbers are added first. Sums to 12.

2. Adds two numbers to sums of 20 using expanded notation.

3. Does column addition with two addends for any two or three digit numbers which do not require carrying. Checks addition problems by adding in reverse direction.

4. Places > , < , or = between addition expressions to show their relationship to each other.

5. Works column addition problems with three or more addends and sums to 20. Checks by adding in reverse order.

Level D

1. Demonstrates mastery of addition facts through sums to 20. Timed test.

2. Does column addition with two addends and three or more digit numbers which do not require carrying. Checks addition problems by adding in reverse direction.

3. Finds the missing addend for problems containing three single digit addends. Sums to 20.

4. Uses the words "sums" and "addends" to label the parts of an addition problem.

5. Adds with carrying to tens place, using two digit numerals with two or more addends. Sums to 200.

6. Adds with carrying to tens or hundreds place, using three digit numerals with two or more addends. Sums to 2000.

7. Adds with carrying to tens and hundreds place, using three digit numerals with two or more addends. Sums to 2000.

8. Finds sums for column addition using three or more addends of one digit. Sums to 50.

Level E

1. Does column addition without carrying with three or more digit numbers and more than two addends.

2. Supplies a missing addend in equations based upon the commutative principle. Selects equation which demonstrates the commutative principle.

3. Adds two or more place numbers using the associative principle. Limit of four numbers.

4. Adds with carrying for four or more place numbers with two addends.

5. Adds two numbers with whole number parts to thousands and one or two decimal places (hundredths place). Each number need not have the same number of decimal or whole number digits.

6. Solves multiple-step word problems requiring addition skills mastered to this point.

Level F

1. Adds with carrying for four or more place numbers with more than two addends.

2. Adds two or more numbers with whole number parts and decimals to the millionths. Addends need not have same number of digits. Maximum of 7 digits.

Level G

1. Adds two negative numbers using a number line or thermometer as an aid.

2. Adds a negative number and a positive number using the number line or thermometer if necessary.

3. Adds any two numbers which are multiplied by the same base to the same positive power.

Level H

1. Adds all combinations of negative and positive numbers without using a number line.

2. Adds two numbers which are multiplied by the same base to the same power.

Diagnostic Instruments

Diagnosis of pupil achievement plays a vital role in the IPI system. In order to guide the learning experiences of individual pupils, it is essential for the teacher to have information about pupil performance related to the specific objectives in the continuum. This information provides the basis for helping the teacher decide where each pupil should begin work and when that pupil is ready to proceed to the next task. Four types of tests have been developed for this purpose.

Placement Tests in Mathematics (Example in Appendix A)

A battery of six tests has been developed for the purpose of determining individual placement within each content area. Each instrument is designed to test pupil performance in each of the content areas in the level. So, for example, the Level B test includes sections on Numeration, Place Value, Addition-Subtraction, Fractions, Money, Time, Systems of Measurement, and Geometry. The six tests are for Levels B through G inclusively.

Not every objective in a unit (e.g. B Numeration) is tested on the placement test for that level. In order to keep the length of the test to a minimum while providing for maximum of information, only the most important, or most characteristic objectives in each unit are tested. No oral exercises are included in the placement tests.

The placement tests are to be administered at the beginning of the school year. Based on past performance of pupils on these tests the following pattern of administration is suggested.

Grade	Tests	Grade	Tests
1	B	4	D and E
2	B and C	5	E and F
3	C and D	6	F and G

Since the purpose of this placement testing is to provide a general indication of pupil performance as efficiently as possible, flexibility must be introduced into the system by the teacher. If, for example, a child in grade 4 has difficulty with the level D test, he probably should not be given the level E test. The information provided in the level D test would be sufficient to indicate the unit in which the child should start working. On the other hand, if a pupil in grade 2 should have mastery of several units in level C he might be given the level D test for those units. The prime goal is to get the pupil started in the appropriate learning exercises as quickly as possible with as much accuracy as possible.

A child is considered to have placed in a unit at a given level if he scores between 20% and 80% on the placement test. A score above 80% indicates that the child should be tested at a higher level, while a score below 20% indicates that the child should be tested at a lower level.

The IPI Pre-test (Example in Appendix B)

The purpose of this test is to determine which skills within the level require further work. For example, a pupil is administered the D Multiplication pretest. His percentage scores on each of the skills are as follows:

Skill 1	100%	Skill 5	100%
Skill 2	60%	Skill 6	20%
Skill 3	100%	Skill 7	100%
Skill 4	100%	Skill 8	100%

Since he must score 85% or better on all skills, the pupil does not pretest out of the unit, but rather, should first be given a prescription for Skill 2. After he has achieved mastery of this skill, as indicated by the curriculum embedded test, he should then be given a prescription for Skill 6. After mastery of this skill the pupil would be given the post-test.

Curriculum Embedded Tests (Example in Appendix C)

The function of the curriculum embedded test (CET) is to assess mastery of one particular skill within a unit. A CET will be administered at specified intervals in the sequence of work sheets prescribed for the attainment of the skill. The CET in Math has two parts. The second part (below the double line) serves as a short pretest of the next objective in that unit of the curriculum. If the skill being tested is the last skill in the unit there will be no test below the double line.

If the pupil masters the CET (upper part) with an 85 % criterion level he will proceed to the next skill in the unit which he has not yet mastered. If this is the last or only skill in which the pupil lacks mastery in that unit he should be given the posttest for that unit. If the pupil does not achieve mastery on the CET, he will be given further work pages of other exercises in that skill and will be required to take another CET (an alternate form of the CET when available).

The second part of the CET (below the dotted line) is important when the pupil needs work in the next skill in the unit, e.g. when a pupil is working in C Numeration 2 and did not have mastery of C Numeration 3 on the pretest. If the pupil indicates mastery (once again 85%) on the second part of the CET he should be prescribed the CET for the next skill rather than actual work in the skill. If he masters the CET (first part) of this skill he will have tested out of that skill and proceed to his next required skill or to the unit post-test.

Materials

If Individually Prescribed Instruction is to be effective it requires lesson materials that teach each of the many objectives that make up each curriculum sequence. Furthermore, it requires that such materials be of a type which, for the most part, the pupil can study quite independently. This section discusses some of the characteristics of such materials and some of the procedures involved in their development.

The key to materials for IPI mathematics is the set of performance objectives that have been developed. It is obvious that materials must be matched to the objectives. It was found that very few materials are commercially available which met the performance objectives and also were acceptable to the IPI procedures. Therefore, a great majority of the materials had to be created.

A rigorous system was developed to match materials and objectives. Several years of work at the LRDC at the University of Pittsburgh finally resulted in a set of materials which is satisfactory. Even with this background of testing, materials are still tested and revised as needed.

The materials consist of multimedia items which appeal to all senses. The great majority will be linear in nature, but for those students requiring it, other stimuli will be used.

The pages of materials are prepared as single pages. This allows for flexibility in assigning or prescribing materials. It is of the utmost importance that the materials be so organized that they can be prescribed in any sequence the diagnosis indicates the need. A few examples of work sheets are included in Appendix C. As will be apparent the basic format of the work sheets is self-instructing.

In addition to the work sheets, there are tapes, and manipulative materials which are prescribed for those students needing them.

There is no attempt made to supervise the materials storage centers with adult personnel, but rather, children are to be responsible for getting their own materials.

In the primary grades students may have help in the selection of prescribed materials and will have all work sheets and tests marked for them. As they progress in independence they begin to mark their own work sheets until by grade 5 or 6 most work sheets are self corrected.

The materials are a vital part of the IPI program. They must provide a flexible program for all pupils.

Staff

The Teacher's Role

As you might suspect, the teacher has a new, challenging, but exciting role in an IPI program. No longer does the teacher spend the majority of her time "spouting" information. In IPI, the teacher must find time to:

1. Diagnose students strengths and weaknesses.
2. Write student prescriptions.
3. Prepare new and/or revise materials (tapes, worksheets, etc.)
4. Plan individual programs with teams.
5. Provide individual students with assistance.
6. Work with small and large groups of students (seminars).
7. Direct the work of the teacher aides.
8. Study students previous work for future planning.

9. Remain warm and friendly in dealings with children.
10. Study new ideas and directions in mathematics.
11. Evaluate materials and procedures used in IPI.
12. Participate in in-service training workshops.

The Teacher Aide's Role

Teacher Aides are an essential aspect of the IPI program. Scoring the student material used in the IPI project, keeping day-to-day records and providing feedback information to teachers are among their most important tasks. These tasks can be broken down into more specific functions under the three major areas listed below.

1. Classroom functions

    a. Grades 1 - 2 - 3
        (1) Scoring and recording all placement tests.
        (2) Scoring and recording all unit tests, making breakdown of the tests by skills, prescription sheets.
        (3) Scoring and recording all student worksheets.
        (4) Obtaining and placing all worksheets in student folders.
        (5) Locating sound discs for pupils and assisting them with sound discs and machines.
            (a) Scoring and recording all work pages supplemental to the sound discs.
        (6) Replacing and duplicating continuum materials.

    b. Grades 4 - 5 - 6
        (Similar activities, except less help and correction for pupils).

2. Functions supplemental to the classroom - all grades.

    a. Keys and prescription folders.
        (1) Making keys for teacher.
    b. Work pages - Continuum
        (1) Keeping inventory, duplication, ordering, numbering in proper sequence and storing the pages.
    c. Weekly reports.
        (1) Current status of work with the units for use in teacher's conferences.
    d. Filing work.
        (1) All tests numbered in order taken and filed in each student's test file.
        (2) Completed students' prescription sheets placed in students' folder.

3. Functions relevant to the study.

    a. Recording for computer use information regarding -
        (1) Tests taken, scores, skills worked, pages done in the skills, days worked, order in which the unit skills were worked.
    b. Specific weekly reports for local project, LRDC and RBS projects, (recording information for)
    c. Taking inventory and ordering materials.
    d. Preparing dissemination materials
    e. Scoring, recording and graphing achievement tests and I.Q. tests.

FACILITIES AND GROUPING

The ideal in arrangement in facilities and grouping of students has not as yet been discovered. Yet, there is no question that they do have some influence on the learning by students. Is there a way to organize for IPI which is better than others? Perhaps, but this should not deter trial use of the program.

At Broad Street, the children are currently grouped homogenously by achievement with four sections per grade being the usual pattern. As far as IPI Mathematics is concerned, how the students are grouped does not matter since students work independently much of the time. Small or large groups can be scheduled within the class or among several classes when this seems desirable. Concern then becomes important for grouping students in other subjects or activities.

The building at Broad Street is designed along conventional lines. It is generally "U" shaped with 2 classroom wings joined by service and special facilities. The one additional space indispensible to IPI Mathematics is a central store room for the individual work pages and testing materials. A supply room was converted for this purpose.

Although not essential to this project, the building does contain a 6,000 volume library; centeal storage for several hundred film strips, records, etc.; an auditeria, a two-station gymnasium; general offices; and, several small offices and work areas.

COST

At present, IPI cannot be initiated into the curriculum without additional cost. During the Field Trial Stage of this program the cost of materials is $15.00 per student. To this must be added the cost of teacher and aide training, materials, training workshops, the salaries of the aides, and any renovations necessary.

As the number of schools using the IPI Mathematics materials is increased, their costs reduce. It is anticipated that the ultimate cost for materials will be about the cost of the average elementary school math textbook.

EVALUATION

It is abvious that a significant amount of time is devoted to student testing as an integral part of the IPI program. The major use of this testing, however, is for diagnostic purposes. Since the student must score at 85% or higher to progress, testing for student grades becomes much less important than in conventionally taught programs. Reports to parents on student progress is in terms of the number of units completed on the continuum.

Proper evaluation of the project in Horseheads requires the use of many instruments to assess its many factors. The instruments selected have been grouped below according to these factors.

EVALUATION DATA

Student Achievement

A. Stanford Achievement Test - Complete Battery

1. Refer only to mathematics subtests
2. Use form X for pretest and form W for posttest.
3. Use levels as follows:
    a. Primary I for grade 1
    b. Primary II for grade 2 and 3
    c. Intermediate I for grade 4
    d. Intermediate II for grades 5 and 6

B. New York State Mathematics Tests

1. Administer to grades 3 and 6
2. Use previous year's data for grades 4 and 5
3. Readminister test following fall

C. IPI Placement Test

1. Placement tests were given to both experimental and control groups at Broad Street in the fall.
2. A follow-up test will be administered in the spring.

Ability

A. Otis-Lennon Mental Ability Test

1. Administered each year to grades 3 and 5
2. Data for some grades will be a year old
3. Use levels as follows:
    a. Elementary I for grade 3
    b. Elementary II for grade 5

Attitudes

A. Attitude toward school (See Appendix D)

1. Test 1 - for experimental and control groups
2. Test 2 - for experimental groups only
3. Administered in February

TEACHER DATA

Attitudes

A. Teacher Attitude toward Program (See Appendix E)
(RBS scale)

B. Attitude toward use of IPI (See Appendix F)

1. Locally constructed.
2. Administered in fall and will be administered again in the spring.

ANALYSIS

The analysis design has been created and will be performed by Mr. Norman Becker, doctoral candidate at Cornell University. He has been retained to implement the analysis stated herein.

The analysis listed by general areas of objectives will be as follows:-

A. Student Achievement - A three way analysis of co-variance (Hays 1963)[18] will be used to test the effects of the Experimental Treatment on student achievement.

B. Student Attitudes - A three way analysis of co-variance (Hays 1963)[18] will be used to test the effects of the Experimental Treatment on student attitudes.

C. Teachers - Teachers in the experimental condition will be given an attitude survey prior to the implementation of the IPI Program. The survey will measure their attitude toward IPI. The teachers will be divided into high and low on this measure through the use of a median.

IMPLEMENTATION

A manual for initiating IPI in a school is presently being prepared and will be available in April, 1969. This step-by-step guide will deal with the many problems faced in implementing IPI at Broad Street School, with suggestions for solving them.

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Footnotes, continued.

17. Krathwohl, David R., "Stating Objectives Appropriately for Program, for Curriculum, and for Instructional Material Development", Journal of Teacher Education, March, 1965.

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APPENDIX A

IPI Mathematics Placement Test

Level B

Revised Developmental Edition, based upon material prepared under the direction of Richard Cox, the Testing and Evaluation Staff, LRDC. University of Pittsburgh. Copyright 1968, 1967 by Meredith Corporation. All rights reserved. Printed in the United States.

me ______________ Date __________
ass ______________ Number __________

What number comes just before 2? Write the number. Do the rest of the problems the same way.

Sample

1, 2

______, 40 ______, 98 ______, 33

What number comes just after 2? Write the number. Do the rest of the problems the same way.

Sample

2, 3

59, ______ 99, ______

---

me ______________ Date __________
ass ______________ Number __________

Ring the smallest number in each box.

16 19 15

96 69 99

47 67 57

Write > or < to show whether the first number is greater or lesser.

16 ○ 61

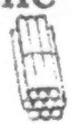
98 ○ 89

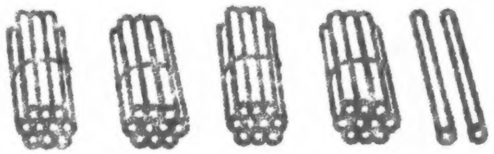
SAMPLE

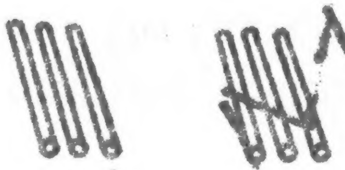
Class ______________ Number ______ ______________ Number ______

SAMPLE

SAMPLE

Write the number of tens and ones.
(Each  has ten sticks.)

 ___ tens and ___ ones

 ___ tens and ___ ones

Look at the underlined number. Ring tens if the number is in the tens place. Ring ones if the number is in the ones place.

75	tens	ones
20	tens	ones
70	tens	ones

Add or subtract.

$\begin{array}{r} 2 \\ +\ 3 \\ \hline \end{array}$ $\begin{array}{r} 5 \\ +\ 3 \\ \hline \end{array}$ $\begin{array}{r} 2 \\ +\ 5 \\ \hline \end{array}$

$\begin{array}{r} 7 \\ -\ 3 \\ \hline \end{array}$ $\begin{array}{r} 9 \\ -\ 5 \\ \hline \end{array}$ $\begin{array}{r} 8 \\ -\ 6 \\ \hline \end{array}$

$3 + 3 =$ ___ $10 - 6 =$ ___

Write = or ≠ in the circle.

$3 + 7$ ○ 9 $12 - 6$ ○ 6

ss ____________ Number ________

Ring the answer.

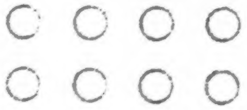
What is each part of a ruler called?

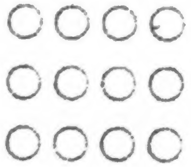
a foot an inch a yard

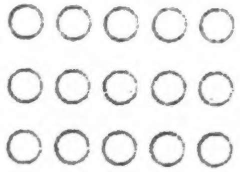
How many rulers put together make one yardstick?

two three four

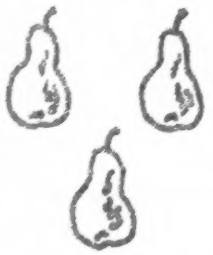
Ring one dozen.

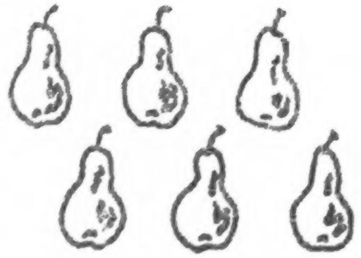


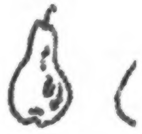




Ring one-half dozen.



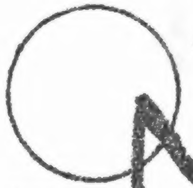


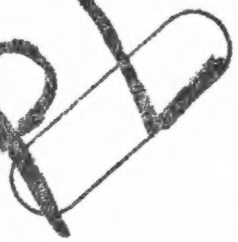


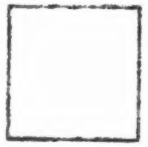
ass ____________

In each row, mark the figure that is named by your teacher.

circle







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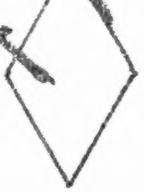
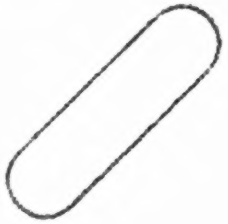
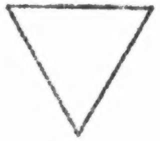
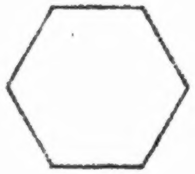
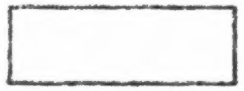


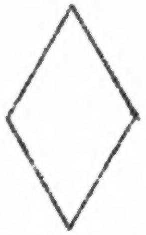


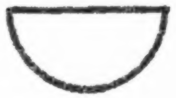


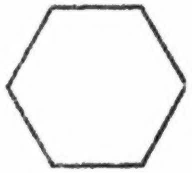


rectangle









Draw a square.

Draw a triangle.

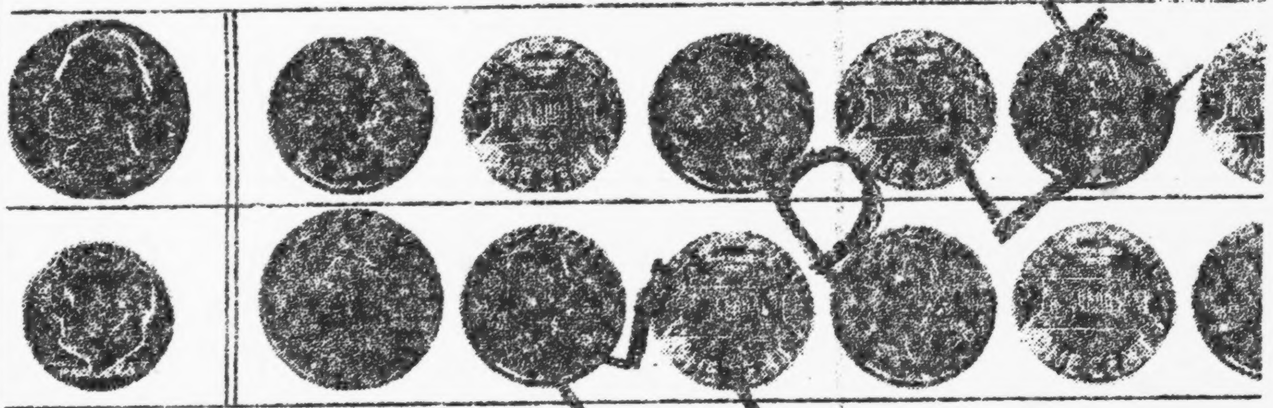
SAMPLE

SAMPLE

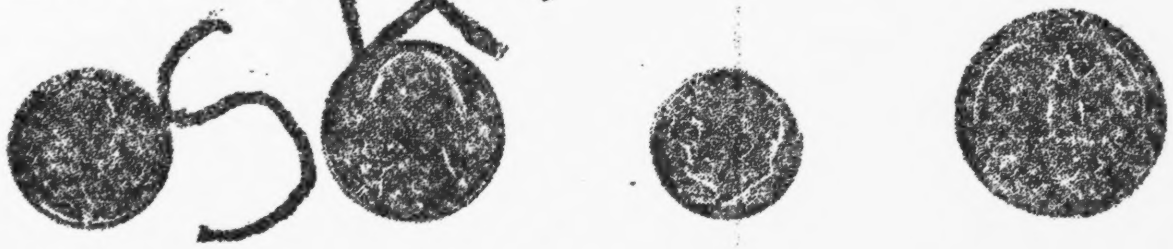
ame ______ Date ______

lass ______ Number ______

In each row, ring the coins that match the amount in the box.

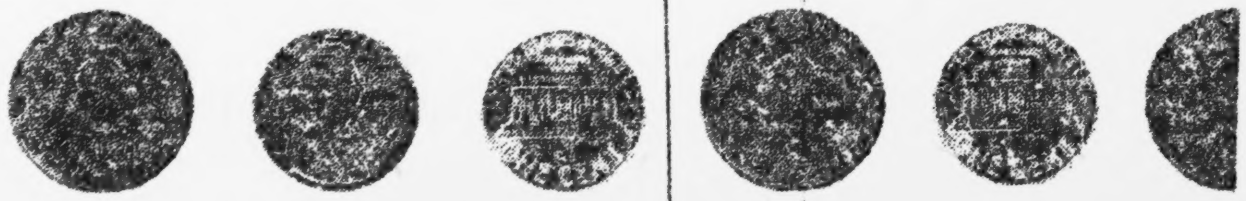


Mark the quarter.



3

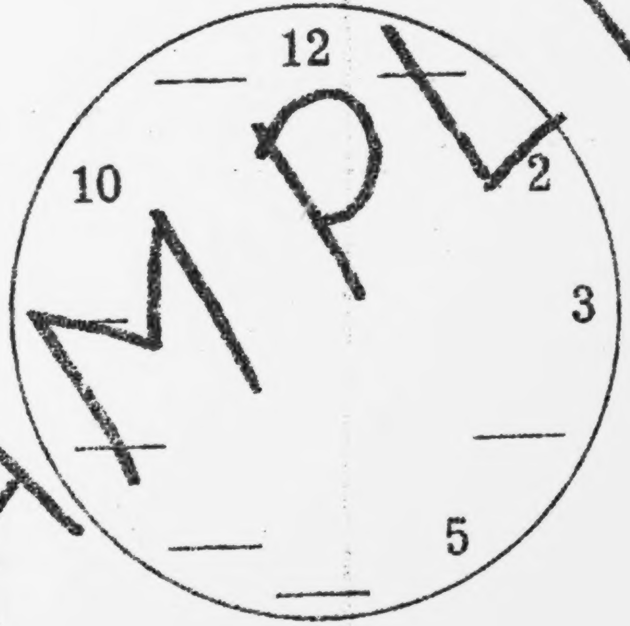
Write the number that tells how much money.



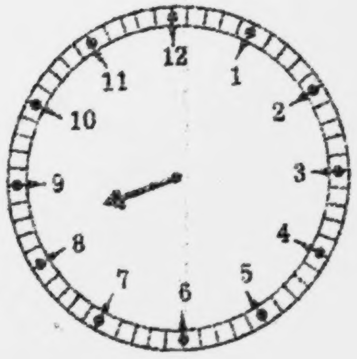
______ Date ______

______ Number ______

Write the missing numbers on the clock face.



The little hand shows



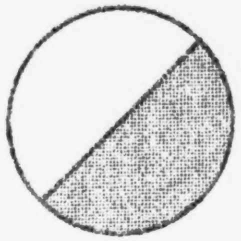
after ______ o'clock and

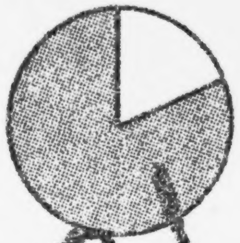
SAMPLE

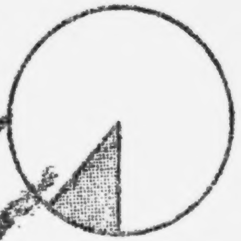
SAMPLE

Class ______________ Number __________

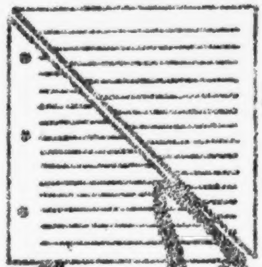
Mark the circle that is half shaded.

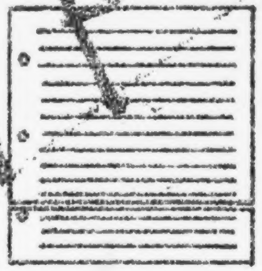


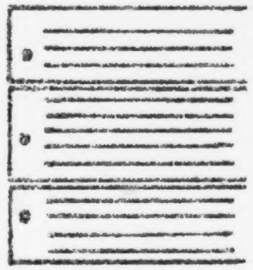




Mark the page that has been cut in half.

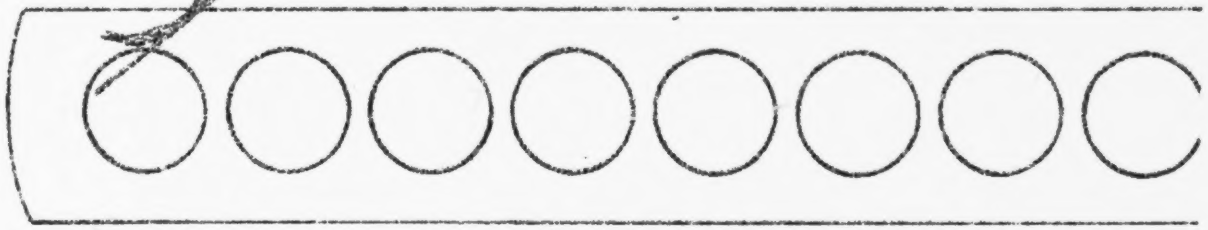


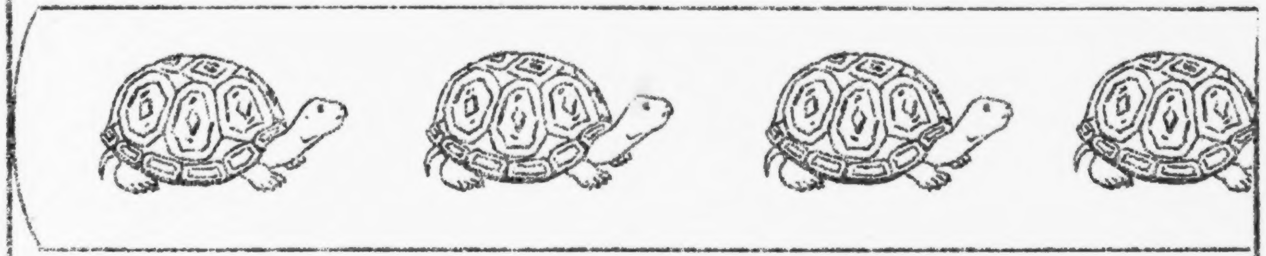


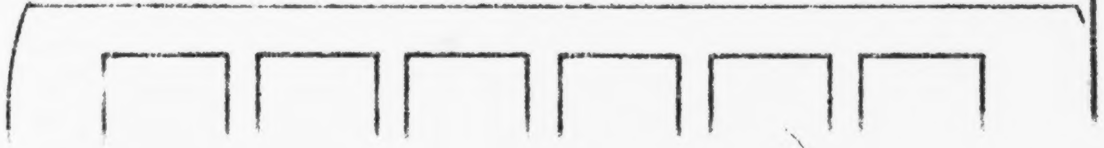


SAMPLE

In each row, ring half of each set.





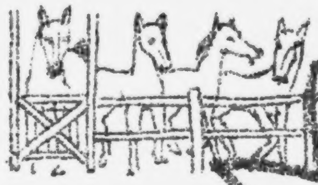


---

lass ______________ Number __________

Ring the answer.

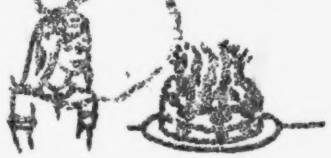
Farmer Joe had 1 horse in his corral and 3 horses outside the corral. How many horses did farmer Joe have?



2 3 4 5

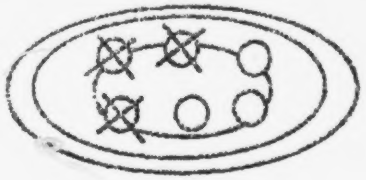
SAMPLE

Mary had 8 candles lit on her birthday cake She blew out 3 of them. How many candles were still lit?



3 5 8 9

There were 6 cookies on the plate. Judy ate 3 of them. How many cookies were left?



6 4 3 2

APPENDIX B

Sample IPI Level B - Numeration

Pre-Test for Skills 1, 2, 6 and 8

and

Post-Test for Skills 4, 5, 7 and 10

ipi MATHEMATICS PRE-TEST

Name ______________________ Date ______________________

Class ______________________ Number ______________________

LEVEL B, NUMERATION (01)

S

TL.
8
NO. C PTS.
7
6
5
4
3
2
1

Numeration: Directs student to put into sequence, write, count, compare, and read numbers from 1 to 100.

Ring the number that is named by the word.

nine 6 4 10 9	six 10 5 6 3
ten 10 2 5 6	four 2 4 5 7
five 9 6 5 4	eight 6 8 10 7
seven 5 7 9 8	zero 8 9 7 0

Revised Developmental Edition, based upon material prepared under the direction of Richard Cox, the Testing and Evaluation Staff, LRDC, University of Pittsburgh. Copyright ©1968, 1967 by Meredith Corporation. All rights reserved. Printed in the United States.

B NUMERATION (01) PRE-TEST

Student: This is an oral test.

Teacher: Ask the student to count by 10's from 10 to 60, and from 40 to 100.

SKILL

TL. PTS.	
2	10
NO. OF PTS.	%
1	5

Student: This is an oral test.

Teacher: Ask the student to count by 1's from 1 to 25; to count by 1's from 34 to 67; to count by 1's from 68 to 85; and to count by 1's from 89 to 100.

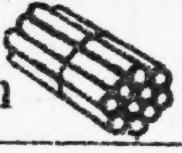
SKILL

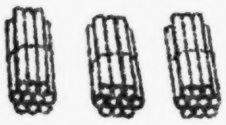
TL. PTS.	
4	10
NO. OF PTS.	%
3	7
2	5
1	2

B NUMERATION (01) PRE-TEST SKILL 6

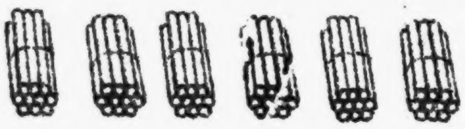
TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

Write the numbers to tell how many sticks are in each row.

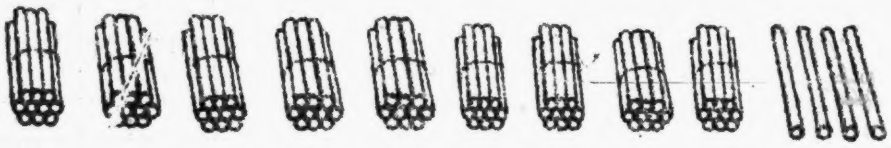
(Each  has 10 sticks.)



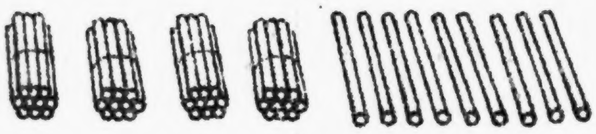
____



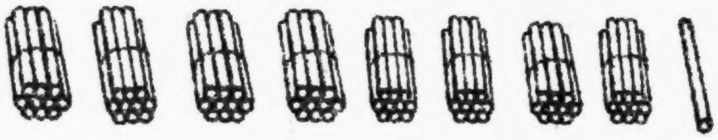
____



____



____



____

B NUMERATION (01) PRE-TEST

SKILL 8

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

In each box, ring the largest number.

63 34 65

56 41 38

62 78 77

In each box, ring the smallest number.

11 21 15

51 48 72

SKILL 9

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20

Write > or < in each circle.

19 ○ 27

16 ○ 61

33 ○ 30

59 ○ 58

68 ○ 86

B NUMERATION (01) POST-TEST SKIL

TL. P	
4	
NO. OF PTS.	
3	
2	
1	

Student: This is an oral test.

Teacher: Point to the listed numbers on the chart and ask the student to "Read these numbers, starting here and ending here."

From 8 to 21
From 32 to 48
From 51 to 69
From 73 to 92

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

B NUMERATION (01) POST-TEST

SKIL

TL.
10
NO. OF PTS.
9
8
7
6
5
4
3
2
1

Count from 1 to 100, and write in the numbers.

B NUMERATION (01) POST-TEST SKILI

Write the number that comes just after each number.

82, ____

57, ____

39, ____

63, ____

95, ____

Write the number that comes just before each number.

____ , 22

____ , 46

____ , 74

____ , 19

____ , 93

TL. PT
10
NO. OF PTS.
9
8
7
6
5
4
3
2
1

B NUMERATION (01) POST-TEST SKILL

TL. PTS	
5	
NO. OF PTS.	
4	
3	
2	
1	

Count from the arrows and mark the ojbect named by the words.

sixth star ⟶ ✡ ✡ ✡ ✡ ✡ ✡ ✡

second square ⟶ □ □ □ □ □ □ □

first dot ⟶ • • • • • • •

third circle ⟶ ○ ○ ○ ○ ○ ○

fourth triangle ⟶ △ △ △ △ △ △

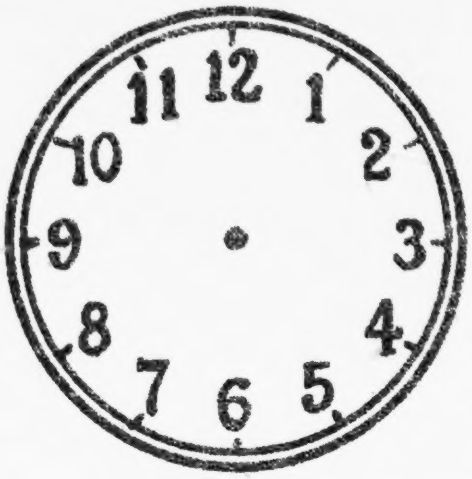
APPENDIX C

Sample of a Curriculum Imbedded Test
for
Level B - Time - Skill One, page 3

CET I

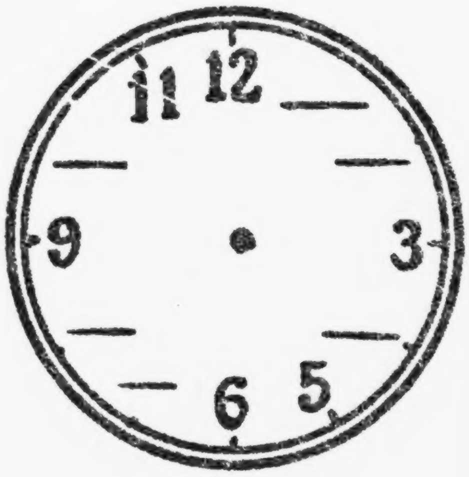
Your teacher will give you this test. Your teacher will point to five numbers on the clock face and you will read them.

TL. PTS.	
5	100%
NO. OF PTS.	%
4	80
3	60
2	40
1	20



Write the missing numbers on the clock face.

TL. PTS.	
6	100
NO. OF PTS.	%
5	83
4	67
3	50
2	33
1	17



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LEVEL	UNIT	SKILL	P
B	10	1	

APPENDIX D

Samples of Pupil Attitude Surveys

Test I
Test II

PUPIL ,ATTITUDE SURVEY

Test I

Questions for I P I and Control Groups

1. During the school day you work on different things like spelling or reading. What kind of things do you like working with the most ?

2. What kind of classwork do you least like ,or dislike ?

3. What subject do you do best at ?

4. (Not applicable to 6th graders)
   What subject do you think that the teacher likes to teach the most ?

5. What subject is the most difficult or hardest for you to learn ?

6. Do you ever tell your Mother and Father about the things that you learn in school ?

   a) If, Yes, : What subject do you tell them about the most ?

7. Do your parents ask you about the things that you are learning in school ?

PUPIL ATTITUDE SURVEY

Test I

8. What subject would your parents like you to do better in ?

9. What subject do you wish that you could do better in ?

10. (Exclude First Graders)

    Do you like working on any subjects this year better than you liked working on them last year ?

    a) If yes, : Which ones ?

11. Do you wish that you didn't have to go to school ?

12. Have you ever thought that you would like to go to college when you are ready ?

13. Do your parents ever talk about your going to college ?

14. (Exclude First Graders)
    How are you doing in Arithmetic this year compared with last year ?

    a) Better ____________
    b) About the same______
    c) Worse ______________

15. Do you worry at all about failing Arithmetic ?

16. Would you like the teacher to spend more time just talking to you while you're doing your Arithmetic than she does with some of the other kids ?

17. Do you know the kids in your class that are better at arithmetic than the other kids ?

18. Do you know the kids in your class that have the most trouble or do poorly in arithmetic ?

PUPIL ATITUDE SURVEY

Test I

19. How well are you doing in arithmetic ?

    a) better than most kids __________
    b) average____________________
    c) worse than most kids __________

20. Does the teacher think that you are doing well in arithmetic ?

21. While you are working on all the different subjects that you study during the school day, when do you get a chance to talk most to the teacher ?

22. Do you like to work at home on things that you are learning in school ?

23. Are there any things that you learn in school that you would like to take home to work on ?

    a) If yes: What ?

PUPIL ATTITUDE SURVEY

Test II

Questions For I P I Group Only

Freedom of Movement

1. When you're working with I P I you often have to move around to other parts of the classroom. Do you like doing this ?

2. Sometimes while you're working with your booklet at your desk the other kids are moving aroung the room or talking. Does this make it harder for you to do your own work ?

Materials Used In I P I

3. Sometimes when the teacher gives you a prescription you work in your booklet or with devises and sometimes the teacher or someone else works with you. What do you like to do best ?

4. Sometimes the teacher will ask you to work with a devise. Why does the teacher ask kids to work with devises ?

5. Are there some devises that you like best to work with ?

   a) If yes : Which ones ?

6. Are there some devises that you don't like to work with ?

7. Do you wish that you could do more or less work with devises than you already do ?

8. Do the devises help you to understand things or do they confuse you ?

PUPIL ATTITUDE SURVEY

Test II

Questions for I P I Group Only

Tutorial Method

9. Has the teacher ever asked you to help one of your classmates with their work ?

   If Yes:

   a) Do you wish that the teacher would ask you to help other kids more than she does or less than she does ?

   b) Why do you think that the teacher asks you to help your classmates ?

   c) Do you think that most of the kids like it when you help them or do they wish that the teacher wouldn't ask you to help them ?

   If No:

   d) Do you wish that the teacher would ask you to help the other kids once in a while ?

   e) Why do you think that the teacher hasn't asked you to help the other kids ?

10. Has the teacher ever asked one of your classmates to help you with your work ?

11. Would you like the teacher to ask other kids to work with you more or less than she does ?

12. Do you ever feel that too many people are looking at your work during I P I time ?

13. Would you rather work by yourself or do you like it better when the teacher works with you ?

14. Would you rather work with the teacher or with one of your classmates ?

PUPIL ATIITUDE SURVEY
Test II

Questions for I P I Group Only

The Separate Level Approach

15. Sometimes the teacher will tell you wo work on a unit that is an A, B, C or D. What do you think all these letters mean ?

16. What letter does the teacher usually prescribe for you ?

17. What letter does the teacher prescribe for most of the kids ?

18. What letter do you like the teacher to prescribe for you the most ?

19. Do you like working at your own prescription while some of the other kids are working at something different ?

20. Would you like it better if all the kids worked at the same thing during I P I like you do with other subjects ?

General Information

21. Do you ever think that I P I is too easy for you ?

22. Do you ever think that I P I is too hard for you ?

23. Would you like to use I P I next year or would you rather learn Arithmetic some other way ?

24. Do you feel that you are learning more or less in I P I than in your other subjects ?

25. Do you wish that you would get a grade on your report card in Arithmetic like the other kids do that don't take I P I ?

APPENDIX E

Teacher Information Concerning
IPI
as an Instructional System

Research for Better Schools, Inc.
Philadelphia, Pennsylvania

PLEASE RATE AND COMMENT ON THE FOLLOWING ASPECTS OF IPI MATHEMATICS:
Please check one (1) response.

1. IPI mathematics for the above average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

2. IPI mathematics for the average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

3. IPI mathematics for the below average pupils in your class is

Excellent	Quite Good	Adequate	Not Too Good	Poor

Please comment:

4. How do you rate the following aspects of IPI math? Please check one (1) response.

	Excellent	Quite Good	Adequate	Not Too Good	Poor	Please Comment
Teacher's Instructional Role						
Aide's Role						
Classroom Atmosphere for Teachers						
Classroom Atmosphere for Pupil						
The Training and Preparation of Teachers						
Planning Sessions						
Discipline						
Level of Children's Motivation						

5. The instructional materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor

If you were asked for one improvement to be made on the instructional materials, your request would be to ...

6. The testing materials are

Excellent	Quite Good	Adequate	Not Too Good	Poor

If you were asked for the single most important improvement to be made in the testing materials, your request would be to ...

7. The demands on an IPI teacher are

______ Above and beyond the call of duty

______ More than previous demands

______ Equal to previous demands

______ Less than previous demands

______ Much less than previous demands

How do you feel about these demands?

8. If you were given the choice, would you have IPI math seminars next year?

______ Yes

______ No

______ Uncertain

Please comment:

BASED ON YOUR FEELINGS, WOULD YOU PLEASE COMPLETE AND COMMENT ON THE FOLLOWING SENTENCES.

9. When IPI mathematics was first introduced in my school, I felt.....

10. Now that I've had some experience with IPI math, I feel............

11. I find teaching in IPI classes to be ...

12. The problems I find in teaching IPI are...

APPENDIX F

Samples of Teacher Surveys concerning the IPI Training Sessions and Attitude toward IPI

TEACHER ATTITUDE SURVEY

I.P.I

One of the concerns of our I.P.I. project is teacher attitude toward I.P.I. Would you recall how you felt prior to the workshop in August? Would you ring the number on the rating line below which best assessed your feelings at that time toward participation:

Strong Reservations — Very Enthusiastic

/ 1 / 2 / 3 / 4 / 5 / 6 / 7

TEACHER ATTITUDE SURVEY

I.P.I.

Please indicate below your attitude toward I.P.I. following the Teacher Training workshop by ringing the number on the rating line that best assesses your feeling toward the project:

Strong Reservations — Very Enthusiastic

/ 1 / 2 / 3 / 4 / 5 / 6 / 7